

folkopakara

(For the Benefit of People)



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Lokopakara

(For the Benefit of People)

Translated

by

Valmiki Sreenivasa Ayangarya

Commentaries

by

Y L Nene

Nalini Sadhale and Shakuntala Dave
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Foreword

The Asian Agri-History Foundation (AAHF), a non-profit trust, was established and registered in 1994 in Secunderabad, India to facilitate dissemination of information on agricultural heritage in order to promote research on sustainable agriculture in South and Southeast Asian regions. These regions provided food security to its population for several millennia, with occasional famines that too in limited pockets, primarily due to drought. Farmers here had evolved some of the most sustainable agricultural management techniques suitable for different agroecoregions. There is a great deal to be learned from the traditional wisdom and the indigenous, time-tested technologies that sustained the farmers of South and Southeast Asia in the past. One of the major objectives of AAHF is to disseminate information on ancient and medieval agriculture by translating old texts/manuscripts into English and publish these translations with commentaries on the scientific content of the texts. The aim of these commentaries of the experts is to stimulate research to validate old practices.

The Asian Agri-History Foundation has so far published five bulletins: *Vrikshayurveda* (The Science of Plant Life) by Surapala (c. 1000 AD), *Krishi-Parashara* (Agriculture by Parashara) (c. 400 BC), *Nushka Dar Fanni-Falahat* (The Art of Agriculture), a Persian manuscript by Dara Shikoh (c. 1650 AD), *Kashyapiyakrishisukti* (A Treatise on Agriculture) by Kashyapa (c. 800 AD), and *Vishvavallabha* (Dear to the World: The Science of Plant Life). This bulletin has the translation of a Halagannada (old Kannada) manuscript compiled by the poet Chavundaraya in 1025 AD.

The Western Chalukya Kings, with their capital at Kalyani (near Bidar, Karnataka, India) had a tradition of supporting scholarship and Chavundaraya was one such poet-scholar in the court of Jaisimha II (1015–1042 AD).

The *Lokopakara*, which meant “for the benefit of common people”, is a vade mecum of everyday life for commoners and describes topics such as astrology, portents, *vastu* (architecture), water-divining, *vrikshayurveda* (the science of plant life), perfumery, cookery, veterinary medicine, etc. In this bulletin, we have selected those topics that are of interest to farmers residing in rural areas.

The author of *Lokopakara* is also known as Chavundaraya II. This is because another Chavundaraya, referred as Chavundaraya I, preceded him by several decades and was a great minister, Commander-in-Chief, as well as a litterateur in the court of the Ganga rulers of southern Karnataka. Chavundaraya I set up the world famous Gommateshwara statue at Shravanbelagola in Karnataka around 980 AD.

This bulletin is based on a printed Halagannada manuscript edited in 1950 by H Sesha Iyengar, a copy of which was obtained from the Madras Government Oriental Manuscripts Library (Adyar Library), Chennai. Since very few people today understand Halagannada, we

requested C K Kumudini, Department of Kannada Studies, University of Agricultural Sciences, Bangalore to translate the manuscript into Hosagannada (modern Kannada). The Hosagannada manuscript was then translated into English by Sri Valmiki Sreenivasa Ayangarya. We are most grateful to Kumudini and Valmikiji for all the hard work.

Three commentaries have been written; one by Y L Nene, another by Nalini Sadhale and Shakuntala Dave, and yet another by Umashashi Bhalerao. These commentaries hopefully would stimulate scholars and researchers to provide notes on the scientific value of Lokopakara. I continue to believe there is an unprecedented opportunity for Indian agricultural scientists today to relate heritage to the present-day agriculture.

Since most people cannot read Halagannada text, we have reproduced only one page of the printed manuscript (Appendix) to give a “flavor” to the bulletin. Two indices of plant names included in this publication were prepared by Y L Nene.

We hope this publication, like the other publications of AAHF, will prove useful to all those interested in agriculture, not only in India but elsewhere in the world.

Y L Nene
Chairman
Asian Agri-History Foundation

Lokopakara

(by Chavundaraya 1025 AD)

(Translated by Valmiki Sreenivasa Ayangarya
from Kannada into English)

About the Translator

Sri Valmiki Sreenivasa Ayangarya is a mathematician by training, who, about 20 years ago, renounced materialistic lifestyle and dedicated his life to improve rural agriculture. For the last seven years, he is actively involved in utilizing knowledge of 1000-year old Vrikshayurveda (Science of Plant Life) for the benefit of farmers in Karnataka, Maharashtra, and Arunachal Pradesh states of India. He has been regularly contributing communications to the AAHF journal Asian Agri-History.

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Introduction

The present English translation of ‘Lokopakara’ is an abridged version of the original text published in twelve chapters by the Madras Government Oriental Manuscripts Library, Madras (Adyar Library, Chennai) in 1950. The original text is at present not available either in the current Kannada language (Hosagannada) or in English. Even a reprint of the 1950 edition in Hosagannada is not available at present, in spite of the Kannada literature having grown by leaps and bounds. In this translation, all chapters, except nos. I, II, III, and XII, have been included. Chapter IX is abridged only to 58 verses from the original 246 verses. Chapter X is abridged only to 23 verses from the original 53 and Chapter XI is abridged to only 41 verses from the original 113 verses.

The original text contains the following chapters:

- Chapter I – Astrological aspects
- Chapter II – Auspicious and inauspicious time (*muhurtas*) for various mundane and religious affairs
- Chapter III – *Vastu* (Architecture)
- Chapter IV – Portents
- Chapter V – Water divining
- Chapter VI – *Vrikshayurveda* (Ayurveda for plants including trees)
- Chapter VII – Perfumes
- Chapter VIII – Recipes
- Chapter IX – Medicine for humans and animals
- Chapter X – Treatment for snakebite, etc.
- Chapter XI – Characteristics of animals
- Chapter XII – Omens

The then famous poet named Chavundaraya in 1025 AD wrote the original text, Lokopakara. The text was written as poetry in the old Kannada language (Halagannada). Though the contents of Lokopakara seem to be very practical and of mundane utility to the common man and the rulers alike, this work cannot be considered the original work of the poet. At best, it can be called a compendium of various “sciences” of the time in a concise form. All the subjects dealt in this book were already available in many ancient Sanskrit works such as Brhat Samhita of Varahamihira, Brhat Jataka, Charaka Samhita, Maya Matam, etc. Varahamihira’s date is determined as 505 AD, i.e., about 520 years prior to that of Chavundaraya. Even the poet himself admits that this information has been culled from

Varaha Samhita, Ma Ridacharya Matha, etc. (Chapter IV, verse 36 is excluded from this publication). Though the contents were not all new, the presentation in the old Kannada language current during his lifetime was certainly useful. This presentation must have helped the common man at that time, who did not know Sanskrit. It was named as Lokopakara (for the benefit of people), an apt title. Though many other ancient Sanskrit works have already dealt the same subjects earlier, it appears that the objective of the poet Chavundaraya, i.e., social benevolence, was missing in them. It is this objective of social benevolence which might have popularized this work amongst the common people and the pundits. Perhaps because its readership was restricted to people not knowing Sanskrit, this work might have appeared as new and original work.

Because of the educational system introduced by Macaulay (1800–1859) in India, during the British rule, and continued even today, many of our practical and mundane ancient works such as ‘Lokopakara’ have been ignored. The subjects dealt in this book can be found highly practical in common man’s daily life even today and perhaps in centuries to come. The simple presentation in Halagannada, the ancient Kannada language, has to be understood properly. Perhaps, it needs to be translated to the Hosagannada, the present-day Kannada prose for use of the common man today.

In the only printed version of this work available now, the verses are written in Halagannada poetry format with a commentary in Halagannada prose-cum-poetry form. This commentary is given for every individual verse and at certain places it is incomplete. There are many deletions or additions. At certain places, the commentary does not agree with the original verse. At some places, even the original verses are missing. These lapses might have existed in the four manuscripts themselves, from which this present printed version is prepared. Where there are deletions of some phrases or words in the original verse or the commentary, I have gone through the original Halagannada verses as well as the cross reference available from the ancient Sanskrit works on similar subjects. I have introduced some verses, phrases, or sentences whenever I found them missing. This is done with the sole intention of doing justice to the laudable work of Chavundaraya as well as to provide a readable English translation.

While writing this English translation, I came across some instances of portentous phenomena reported to me through the newspapers and radio, as also with my own personal observations. I would like to mention them here for the benefit of the readers:

- The formation of a ‘halo’ around the sun at noon on 5 September 2002 at Bangalore was reported with a photograph in the English daily, Deccan Herald, 6 September 2002, published from Bangalore, Karnataka.
- I heard the news, through All India Radio that water in a big tank in a village in West Bengal became pink on 3 October 2002. The villagers reported the intrusion of an airplane that dropped something into the tank. The Indian Air Force had categorically denied any intrusion in the Indian air space of the said locality on that day.

- While walking in the premises of Keshavapuri, Maharashtra around 1800 hrs on 13 October 2002, I saw the formation of a halo around the moon. Though I could not ascertain the exact time, there were three or four small clouds covering the moon and a halo visible around the moon. After the disappearance of the clouds, the halo also disappeared.
- Also, I observed formation of a halo around the moon in the evening of 22 October 2002 around 1940 hrs at Keshavapuri.

I have given these instances only to illustrate that the subjects dealt in this book are still found practical and very much mundane, though some of the modern, scientifically tempered people may dismiss these contents as obscure or absurd. There is no doubt that our ancient works in various Indian languages are very practical.

I have not come across any intellectual debate or discussion on the subjects dealt in Lokopakara at least in the Kannada literary field. I have yet to come across any other debate or scholarly opinion on the various mundane cultural habits, remedial measures, and technology explained in the text. Perhaps, the absence of a Hosagannada prose text, the absence of recent reprints, and the ancientness of the topics dealt in this book might be the reasons for the absence of an intellectual debate. I had come across a small portion of Lokopakara published in the Hosagannada prose form in 1996, which had a third reprint in April 1997, and which deals only with the sixth chapter of 'Vrikshayurveda'. The editorial of this booklet states that the officials of the forest department of the Government of Karnataka had successfully conducted experiments on recommendations made in the verses of 'Vrikshayurveda', the sixth chapter of 'Lokopakara'. An experiment conducted at a medicinal plant garden maintained by the forest department on the emblic myrobalan plant in 1992 was also mentioned on the back cover of this booklet to impress upon the readers on the present-day utility of the verses of 'Vrikshayurveda'. Except for this small booklet and a limited debate in a restricted circle of organic farmers of the old Mysore area, Lokopakara has not attracted attention since 1950. It is necessary that the present generation should be exposed to this unique, practical, and very much mundane text.

There has been also a limited discussion on the practical utility of Indian astrology having been recognized by the Western scientists in the 20th century; this is available in the introduction to Brhat Samhita, translated by M R Bhat. I have yet to find a detailed recorded debate on the contents of Brhat Samhita and their present-day practical utility.

A small discussion on the subject of '*ambugareyuvudu*' is given on page ix of the Introduction written by the editor H Sesha Iyengar, in the only printed version. Sesha Iyengar has expressed the view that the remedial measure of '*ambugareyuvudu*' is not clearly mentioned in the text or in the commentary. He has espoused an unwanted averment on a Jain tradition of '*gomukhivrata*' and has attempted to direct the subject to Jain tradition. This is clearly wrong. Perhaps he might have thought that this Lokopakara and all its chapters are original and independent works of the poet Chavundaraya, which is incorrect. Perhaps due to lack of

appreciation that Lokopakara is a compendium of various subjects already dealt in ancient Sanskrit works like Brhat Samhita and others, Sesha Iyengar has taken recourse to a Jain ritual of ‘gomukhivrata’ unnecessarily. Verse 4 of Chapter IV of Lokopakara is just the Halagannada version of the sixth sutra of the forty-sixth chapter of Brhat Samhita.

While comparing these verses, the expiation called ‘ambugareyuvudu’ is the ‘rudrayathane bhumau godohath’, which means ‘milking of cows on the grounds of a Rudra temple’, which was an existing practice even before Varahamihira and his Brhat Samhita. Even Varahamihira mentions the works of his several predecessors in Brhat Samhita. So the opinion of Sesha Iyengar that ‘milking of cows on the grounds of a Rudra temple’ called ‘ambugareyuvudu’ by Chavundarya is not a Vedic tradition is clearly incorrect. In order to corroborate his misleading allusion to a Jain tradition, Sesha Iyengar has mentioned the practice of maintenance of the idols of Yaksha and Yakshi, without the knowledge of the same existing in the Vedic tradition earlier. The subject of the idols of Yaksha, etc. and the unnatural behavior of these idols is clearly mentioned in verses 13 and 14 of the forty-sixth chapter of Brhat Samhita. So the relation to any Jain tradition is not justified.

In the current Vedic practices known to me, especially those followed in the rural parts of India, this ‘ambugareyuvudu’ may also be interpreted a little differently. Such a practice of milking of cows is seen in some Indian epics like ‘Sri Venkatesvara Mahatme’, etc. One of the Vedic practices, a remedial measure that is practiced even today, is the ‘Kshirabhiseka’. This *Kshirabhiseka* is an Indian tradition wherein a ritualistic bath to the idol of the deity is offered. The belief is that with this ritualistic bath the deity’s idol gets purified from all the ills caused by the potential phenomena. “Ainbu” in Kannada means “milk”, “gareyuvudu” means milking, pouring, etc.; so the term “ambugareyuvudu” can also be understood as a ritual wherein the fresh milk is used to sanctify the idol through the purificatory milk bath. Presently, this *Kshirabhiseka* is a regular practice in many of the temples especially the Rudra temples and Vedic homas. After the *Kshirabhiseka*, the ritualistic milk is shared amongst the people who have participated in the remedial measure. In rural India, sharing of milk is believed to be a token of prosperity, wealth, and health even today. I have personally performed such remedial measures in many places and also have participated in such festivities. The prosperity is also identified by the wealth of the cattle and the quantum of milk in any house. There is a popular saying of *halina hole* for the richness and prosperity of any house or village or state. *Halina hole* in Kannada means “abundance of milk”.

About the practical adoptability of the contents of the text ‘Lokopakara’, I have applied these in my daily life at many a time even without reading it. My forefathers used to prepare various perfumes, especially ‘sadu’, prepare various recipes and dishes mentioned in ‘supa shastram’ (the science of cooking), check marriage compatibilities, prepare various medicinal preparations, etc. During my boyhood, I myself had prepared many such recipes without any knowledge of Lokopakara or Brhat Samhita. This is the impact of these ancient texts in the daily chores of our life. Even today, my mother in her late sixties personally makes such preparations mentioned in Lokopakara. She is not a graduate according to the Macaulay’s system of education, but a “doctorate degree holder” and a “research guide” in the traditional Indian school of education. I have learned a lot of such preparations from her and other

relatives. I can still prepare them. This is mentioned here to make the reader understand the blend of ancient theory and practice in the daily life even today.

In our village, where our community people live together, most of the recipes are prepared by the individuals as a routine, both in individual houses and the community locations like temples, etc. The younger generations are trained in this practical school of tradition. No doubt, the influence of globalization is taking a “heavy toll” of the traditions here as elsewhere.

As a practitioner of tribal medicine, I have found this book useful in preparing various medicinal preparations. Some of the medicinal preparations and the preparations of ‘*supa shastram*’ here in this work have been so much a part of our daily life or the religious way of life, that we find it strange that the knowledge received through our parents, families, and society, existed in literature of yesteryears.

I have prepared many plant medicines out of experience and the knowledge of ‘*Vrikshayurveda*’ from this text. I came to know of Surapala’s *Vrikshayurveda* only in 2001 and the ‘*Vrikshayurveda*’ of Lokopakara in 1996. I have successfully used the theory of ‘*Vrikshayurvedam*’ for preparing various herbal pesticides and growth promoters. I have been applying many such techniques of Lokopakara in my day-to-day life and find these more effective in use than those mentioned in many other ancient Sanskrit works, though I am familiar with them as well.

Chapter XI of Lokopakara deals with the characteristics of elephants, horses, cows, goats, dogs, and poultry, though one may dismiss that these are not of much use today, as these animals are no more reared by the common people or the rulers. But it will be wrong to conclude so. Even today, elephant rearing and trading is a rural practice in India, especially in Kerala state. A recent instance is the donation of an elephant to the Lord Krishna temple at Guruvayur, Kerala in 2001 by the Chief Minister of the State of Tamil Nadu Ms J Jayalalitha. This temple maintains more than fifty elephants today. Elephants are used for local transport of timber and other heavy articles even today in many rural parts. In Kerala, elephant breeding and trading is a continuing practice. The traders look for all the characteristics mentioned in this book to finalize their purchase. Similarly, in some interior parts of Tamil Nadu, I still find the breeding and trading of horses, especially the native varieties. The common tribal people in these areas learn horse riding as a part of their life. Horse is used for movement of goods and people in these areas. Being a hilly terrain and a remote place, Sirumalai does not have any modern transport facility even though it is just 30 km distance from Dindigul, a Taluk (subdistrict) headquarters in Tamil Nadu. To decide their purchase, people trading in horses look for the characteristics mentioned in this compendium. Cattle trading is still very common today in both rural and semi-urban parts of India. The traders-cum-experts consider the characteristics of teeth, eyes, ears, horns, hairy circles, back, neck, hoofs, tongue, ankle joints, hump, strength, udder, testicles, color, etc. before deciding the purchase of cows, bulls, and calves. The first thing any expert checks is the number of teeth of any cattle, by inserting his hand into the mouth of the cattle, before deciding its purchase. Similarly, the rural people look for the characteristics of goats, dogs, and poultry also before deciding their purchase. The contents of this book can thus also be called “An encyclopedia of the tribal knowledge and practices of rural Karnataka” as this book is written in Kannada language.

Due to my proximity to our traditional ancient life system and its practices, I readily accepted to translate this abridged version of 'Lokopakara' into English, when Dr Y L Nene, the Chairman of Asian Agri-History Foundation requested in August 2002. I thank him for having provided me with an opportunity to do this service to the world, which will certainly benefit the people at large. Surely this was the intent of the poet Chavundaraya when he compiled 'Lokopakara' about ten centuries ago in Halagannada language.

I am even today finding the currency of all the incidents of subjects mentioned in Lokopakara as well as in Brhat Samhita. All these subjects are practical mostly in the Indian agricultural environment, especially in the remote areas. Anyone who does not have a practical experience and knowledge of Indian rural agricultural traditional environment may not find this book useful. This book may not be of any practical utility to the metropolitan, urban, non-agriculturalist multi-story dwellers, though they are not excluded from the subjects dealt herein. I have strived hard to provide correct or closer meanings of some of the Halagannada/Sanskrit words, which have no similar meaning in English literature. I have attempted to provide a more exhaustive explanation of certain technical words on the translation to enable the reader to understand it well. Wherever I have found dissimilarities in the text and the commentary provided in the printed edition, I have considered the text only.

I would be grateful to receive any queries and views on the subjects dealt herein, which will provide a much deeper intellectual insight to one and all.

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Lokopakara (Translation)

(For the benefit of people)

Chapters I, II, III, and XII have been excluded in this publication.

Chapter IV – Portents

1. In this mundane world, many incidents contrary to nature occur and torment people. I shall now expound these portents along with the methods of expiation for the protection of living beings from the evil effects of these portents.
2. Sins accumulate on account of the misdeeds of the people, averting god's grace. The displeasure of gods results in the portents. The three kinds of portents are celestial, atmospheric, and terrestrial.
3. The unnatural behaviors of the “planets” like sun, moon, etc., asterisms like Ashwini, etc. are celestial portents. Storms, thunders, meteors, rainbows, and halos are the atmospheric portents. The quiver of stationary objects like trees, idols, earth, and the unnatural acts of animals are the terrestrial portents.
4. Performing remedial measures to please gods can pacify the evil effects of these portents. Donating gold, food, lands, and cows can pacify the celestial portents. By installing a fireplace at the northeastern quarters of the ceremonial location, the homas (fire worship) should be performed. Milking of cows on the grounds of a Rudra temple should also be done. These remedial measures will pacify all the three types of portents. Among the three portents the celestial ones are virulent. The celestial ones can be pacified by the remedial measures to be explained later.

[The remedial measure of milking of cows on the grounds of Rudra temple is not mentioned in the commentary, but available in the text.

Homa is an offering made to the sacred fire while chanting the relevant hymns of the concerned deity.]

5. The adverse effects of the celestial portents get manifested with the king (rulers), his children (administrators and deputies), treasury (finance), preceptors (officers), vehicles like the royal horse, etc. (vehicles and army), consorts (employees), and the subjects (people in his kingdom).
6. The grotesqueness found in the idols or the images of Brahma (the creator), Yama (the deity of death), and the sages brings evil to the Brahmins (learned men of Vedic scriptures). The grotesqueness found in the idols of the lords of the eight quarters, viz., Indra (the lord of the gods), Agni (God of fire), Yama (deity of death), Nirruthi (king of demons), Varuna

(deity of rain), Vayu (deity of wind), Kubera (deity of wealth), and Ishanara (sun) brings evil to the cattle. The grotesqueness found in the idols of Naga (serpent god) brings evil to the retinue. The grotesqueness found in the idols of Karthikeya Swami (god of war) brings evil to the ordinary potentates. The grotesqueness in the idol of Vinayaka (remover of obstacles) brings evil to the chief officers of the state. The grotesqueness found in the idols of Vishnu (the almighty) and Brahma (the creator) adversely affects the subjects at large. The grotesqueness of the idols of Yaksha (demi-gods) brings danger to the women. Likewise, the grotesqueness of the idols of Rakṣasa (demon) poses danger to the children. The grotesqueness found in the idols of planets, Venus, Jupiter, and Saturn, brings evil to the ministers. These portents cause evil effects within eight months from the day of occurrence.

7. The quivering, falling, and breaking of the beautiful idols of gods, temples, phallus (the symbolic idol of Shiva), the breaking or falling down of the wheel and axle of the temple car (the wooden car of the temple), or the immobility of the temple car during the car festival foretells destruction of the king of the country.

8. To pacify these wraths (the evil effects of the portents), the royal priest should take bath and purify himself both physically and mentally. He should fast for three days and worship the distorted idol in eight ways along with songs, dance, and instrumental music for a period of seven days.

[The eight ways of worship are known as *snana* (water), *kusuma* (flowers), *anulepana* (sandal paste), *vastra* (clothes), *madhuparka* (a recipe made from curd, ghee, water, honey, and sugar), *bhakṣya* (food), *bali* (an oblation), and *sthalipaka* (oblation to the fire).]

9. He should offer the sixteen homages like *madhuparka*, etc. to the distorted idol in an orderly manner during these seven days. The *homa* while chanting the relative hymns of the deity should be performed with the offering of *sthalipaka* during the seven days. This will lead to the pacification of these portents.

[The sixteen homages in order are: *asana* (seat), *svaguta* (reception), *padya* (water offered to wash the feet), *arghya* (water offered for drinking), *snana* (ritualistic bath), *vastra* (cloth offered), *abharana* (ornaments of gold and silver), *gandha* (sandal paste), *sumanas* (praising with verses), *dhupa* (incense), *dipa* (lamp), *naivedya* (eatables offered), and *vandana* (adoration).

The *sthalipaka* is rice cooked in an urn on the ritualistic fire itself and later offered as '*havis*' to the fire in a *homa*.]

10. The portents of observation of darkness in the day, dust formation in the absence of wind force, fumes without the presence of fire, sight of stars in the sky during the daytime, and non-appearance of stars in a clear sky at night bring tribulations, famine, and epidemics in the whole country.

11. Rains of gold, fruits, and grains bring eeriness to the people. Rains of burning coal and manifestation of dust in the absence of wind force destroy the particular town (place). The

unnatural death of animals foretells the destruction of the whole country. Intermittent rains cause calamities arising from excessive rains, drought, annoyance from locusts, rats, parrots, and other birds, and invasion by a foreign army or by own army (living in exile).

12. Cloudless rains or untimely continuous rains for seven days foretell danger to the king. The rains of blood and water bring evil to the chief minister. Excessive blood rain brings evil to the king.

13. If the shadow of any object lies in the direction of the sun, if there is no shadow of any object in a cloudless sky with bright sun, if the coldness becomes warmness and vice versa, the whole country will be subjected to disaster. If rainbow appears on a cloudless day or night, this foretells evil to living beings from starvation.

14. The sounds of singing and musical instruments heard in the sky bring epidemics and death to the people. When sounds emit from musical instruments without being struck or do not emit sounds after being struck, it presages the death of the king and occurrence of a ferocious war.

15. To appease these atmospheric portents of the wind, the king should worship Vayu (God of wind) with utmost devotion by chanting the hymns of Vayu. He must request Brahmins to perform *japa* (chanting of Vedic hymns) and *homa*. Sumptuous food should be offered to the Brahmins and benevolent and virtuous deeds like donations and gifts should be performed. This will appease the portents of wind.

16. The unseasonal instant thunder at sunrise presages disaster to the kings and their ministers; in the second *yama*, to the chief of the town; in the third *yama* to the serving Brahmins; and in the period of fourth *yama* and the sunset, to the traders, thieves, gamblers, and low-caste people.

17. Thunders in the first *yama* of the night presage disaster to the plant life; in the second *yama*, to the goblins and devils; in the third *yama*, to the elephants and horses; in the fourth *yama*, before sunrise, to travelers.

[Every day and night is divided into four equal parts called *yama*. The first *yama* of the day commences from sunrise and the fourth *yama* ends at sunset. Similarly, the first *yama* of the night begins at sunset and the fourth *yama* ends at sunrise of the next day. The duration of one *yama* varies according to the length of the day and night. While taking day and night to be of equal duration of twelve hours, one *yama* is of three hours duration. (Some people call it as 'watch', which I feel is not the proper English meaning. *Yama* is a Sanskrit word and it is called *java* in Kannada.)]

18. Meteors are seen in various colors in all directions of the sky. They are divided into five types, viz., meteors, thunderbolts, lightning, shooting stars, and *dhisnya* (fire balls).

[In the text and the commentary, the fifth meteor is referred as *visnu*, which is corrupt. It should be *dhisnya*. Perhaps, the error might have crept in the manuscripts, which might have been carried over in the printed edition. Its reference is in Brhat Samhita Chapter 33, verse 1.]

19. Sight of white meteors in the north presages evil to the Brahmins; red in the east, to the Kshatriyas (warriors); yellow in the south, to the Vaishyas (traders); and black in the west, to the Shudras (labor class).
20. The portentous phenomena like cooling at noon, moon rays causing warmth, quivering of the earth, and falling of multi-colored meteors results in the absence of timely rains. These presage evil to the king. A neighboring king will invade the country. Famine occurs. These are culled from the science of Mandacharya.
21. When the marching king has sun towards his right, he becomes victorious. If the moon is at his left, he gets defeated. If meteors fall from the sky in front of the marching king, he wins the battle. He wins the battle if he fights facing the direction in which the meteor falls.
22. If the meteors fall on the idols of village deities, it presages evil to the entire nation; on the arsenal, woes to the king; on a farm, to the concerned farmer; on a house, to the concerned owner; on a cattle shed, to the cattle; and on trees of worship grown on the platforms in the village, troubles to a very important person of the country.
23. When the sunrays are dispersed by the wind into several colors in a cloudy weather and appear like a bow, the latter is called a rainbow. Its luster is similar to that of the hood-gem of Adisesha, emitted through his breath. Rainbow seen in the opposite of a traveler's direction ruins him.

[Adisesha, the king of serpents, is called the bed of Lord Vishnu, the Almighty.]
24. If a multi-colored rainbow touching the earth at both the extremes appears double, it is auspicious and brings copious rains.
25. A pink-colored rainbow foretells war; yellow, threat of fire; and black, a devastating drought.
26. Sight of a rainbow on a tree brings good harvest of crops; on land destroys the plant life; on water brings famine; in the rains, presages drought; in the drought period, brings rains; and in the west also, brings rains.
27. Rainbow seen in the west in the months of *Jyestha* (May–June), *Ashadha* (June–July), and *Sravana* (July–August) cause drought for the next three months.
28. Sight of a rainbow at night in the east brings eeriness to the kings; south, to the village chiefs; west, evil to the feudatory prince and businessmen; north, evil to the counselors and ministers; in the intermediate quarters, viz., southeast, southwest, northwest, and northeast, evil to the people living at the respective quarters.
29. Rays of the sun and moon produce halos that are blue, peacock blue, silver, sesame (black), milk (conch), or water. Smooth, circular, and white halos of sun and moon are auspicious and foretell prosperity.

30. The halo resembling peacock neck in color brings copious rains; multi-colored one foretells danger to the king; that of a rainbow, war; and of smoky color, panic.

31. Halos that stay in the sky from sunrise or sunset, circular, broken, unbroken, rough, appearing in the form of a cart, bow, or a triangle foretell disaster to the whole world.

[The commentary is corrupt. The text is considered here for the translation.]

32. The cries of wild animals and birds at the time of formation of a halo of sun and moon at dawn, noon, or night foretell eeriness; fall of meteors during halo formation cause death to the rich.

33. Mars inside the halo foretells danger from weapons and fire to the ministers, village chiefs, and the king. Mercury is auspicious to scribes, plant life, and the ministers. Jupiter indicates threat to the king, minister, and the royal priest.

34. Venus inside the halo foretells agony to the queen; Saturn causes evil to the Shudras (laborers), and millets; Rahu brings excessive rains and troubles to the fetus of the pregnant women; and Ketu causes many hardships.

35. Presence of two planets inside a halo results in wars; three, famine; four, danger to the king; and five, the mass destruction of the country.

36. A halo having two circles presages threat to the army commander; three circles, to the prince. The appearance of a comet (Ketu?), while the planets are inside a halo, nullifies all the evil effects immediately.

[This information has been taken from the Varaha Samhita.]

37. The appearance of a parhelion to the north of the sun, brings in rains; south, forceful wind; on two sides of the sun, excessive rains; above the sun, death to the king; below the sun, danger to the people; and around the sun, epidemics, threat to the king, and evils to the low-caste people (hunters).

38. Appearance of parhelion possessed with the color of the sun in the particular season: blue, white, and opal color is auspicious; yellow causes increase of diseases and maladies; and red causes a fierce battle. The above results appear in countries where such parhelions appear.

39. Appearance of an aerial city of white color brings evils to the Brahmins; red to Kshatriyas (warriors); golden yellow to the Vaishyas (traders); black to the Shudras (labor); and of smoky color to the hunters.

[The commentary is corrupt. Marasarpa is interpreted as 'Pratisurya' which is incorrect. Marasarpa is the Kannada name of Gandharva nagara (aerial city).]

40. Appearance of an aerial city in the east is dangerous to the king; west to the subjects; south to the army commander; north to the royal priests; and in all quarters, immense danger

to the whole country as well as the king. The *santa* direction brings victory to the king and the *dipta* direction, disaster to the king.

[The *santa* and *dipta* directions are to be determined for every *yama* of the day and night (see table given below).]

41. The appearance of an 'aerial city' to the north of a town presages evil to the town. Though the appearance of an 'aerial city' to the northeast of a town is auspicious to the town, it presages evil to the five artisans, viz., carpenters, goldsmiths, blacksmiths, stonemasons, and braziers.

42. Appearance of an 'aerial city' to the right of a town, presages victory to the king; left, threat from defeat by the enemy. If seen like a multi-colored flag, it forebodes war.

43. In order to nullify evil effects of the above-mentioned atmospheric and celestial portents, viz., the parhelion, rainbows, aerial city, halos and meteors, the king should worship the sun and the moon. The idols and images of the respective deities should be made and offered the sixteen homages with due devotion. Brahmins should be donated with food, clothes, gold, etc. along with the respective idols, with utmost pleasure. These portents then get pacified.

44. If fire goes out suddenly, or fumes appear without the presence of any fire, or sudden fire is observed, these foretell eeriness and death to the king. The entire country gets ruined.

45. If the weapons like sword, etc. come out of the scabbard while trembling on their own by making sounds, if the festoon in front of the house gets sparked by fire, if the temples, houses, arches, flags, etc. burn without fire or by lightning, these portents foretell the occurrence of a war within the next six months.

46. Presence of fumes without fire in the bedroom, burning of a worn cloth, and sparks coming out of one's own head cause immediate death of the concerned person.

47. To ward off the evil effects of the above portents of the fire, one should perform homa to the Agnidevata (fire god) with ghee, mustard seeds, and the *samidha* (twigs) of the milky trees along with the chanting of Vedic hymns addressed to the fire god. He should donate cows, land, food, gold, etc. to the Brahmins. Thus, the evil effects of the portents become nullified.

Santa and dipta directions

<i>Yama</i>	Day ¹				Night ¹			
	I	II	III	IV	I	II	III	IV
<i>Dipta</i>	E	SE	S	SW	W	NW	N	NE
<i>Santa</i>	N&S	NE&SW	E&W	SE&NW	S&N	SW&NE	W&E	NW&SE

1. E = East, SE = Southeast, S = South, SW = Southwest, W = West, NW = Northwest, N = North, NE = Northeast.

48. If the 'never-dry' places like lakes, deep reservoirs, and tanks (small or big) dry up all of a sudden, if the rivulet in front of the village flows upwards, these portents presage fast destruction of the village.

49. If the rivers flow carrying fat, blood, liquor, or oil excessively, it forebodes attack by the enemy king within the next six months and destruction of the whole country. The enemy army finds the fragrant products filthy. The enemy army does lot of excesses. If the water springs up from a non-existing spring, it brings great disaster on the earth.

50. Sudden appearance of fire, smoke, bubbles on water, sound of talking, shouting, blessings, singing, weeping from the reflected image of the water foretell epidemics and devastation to the whole country.

51. Such portents of water should be pacified by worshiping Varuna (God of water) by chanting the related Vedic hymns. Brahmins should be caused to perform *japa-tapa* (meditation) and homa. This will ward off evil effects of the water-related portents.

52. Sudden falling of tree branches in the absence of strong wind or flow of 'blood' from trees foretells sudden battle at the place. Appearance of smoke and fumes and appearance of unseasonal flowers and fruits on the sacred trees of a village foretell danger to the king of the country. Sudden flow of water or oozing of 'milk' from the trees foretells loss of food and money through a drought.

53. New sprouts from withered trees, withering of healthy trees, flow of 'oil' from the trees cause crop loss and famine in the country. If a liquid like ghee flows from a tree, epidemics will occur amongst the subjects of the country.

54. Unseasonal blossoming of young plants foretells mortality to children at that location. Off-season flowering and fruiting of trees and uprooting of trees without strong winds are indications of peril to the country. Similarly, 'walking' and 'talking' of trees foretell annihilation of people of the country.

55. Such portents of trees happen within the next ten months of their appearance. To ward off the evil effects of such tree portents, the trees should be covered with an umbrella. An idol of Lord Rudra (Shiva) should be installed under the tree as per the science (*shastras*) of installation. Brahmins should be caused to perform the homas, and fed with the best food (usually called as *hatu payasa* in Kannada prepared out of rice cooked in milk and added with sugar). Land should be donated to Brahmins according to one's capacity. This will pacify the portents of the trees.

56. If the stalks of sorghum, barley, foxtail millet, etc. bear two ears of corns or if the Indian lotus (*Nelumbo nucifera*) and Indian red waterlily (*Nymphaea nouchali*) plants grow together jointly, these foretell death of the owner.

57. If the sowed crop is too thick, if a single tree bears non-uniform flowers, tender fruits, unripe fruits, and fruits during the off-season, these foretell the attack and invasion of the

country by a foreign enemy king. If healthy people find the food items and fruits insipid or if sesame seeds do not yield oil or yield only a small quantity of oil, these foretell eeriness to the country.

58. The abnormal flowers, fruits, etc. found in the plants and trees as above should be removed and kept at a place outside the village and worshiped as a remedial measure. Homas should be performed according to the *shastras* (the code of performing homas). Gold and other gifts should be donated to the Brahmins. These remedial measures ward off the evil effects of the portents of crops.

59. If Indra's banner tied in the house at various festivals, flags and festoons tied to the door break and fall down, without any cause, on their own, these foretell death of the king.

60. If the oxen and plow get entangled during the plowing work, if the house utensils get deformed, if the jackals howl in the day while facing the sun, these forebode the threat of weapons in the country.

61. The howling of birds and animals in the *dipta* direction during sunrise and sunset and excessive roaming of birds in the sky in the opposite directions forebode great and sudden danger to the country.

62. If the village birds roam in the forests, and the forest birds roam in the villages or towns, if the birds flying in the day fly at night, or if the birds flying in the night fly in the daytime, these indicate evil to the country.

63. If forest birds like *halakki*, black bird, wild pigeon, crane, falcon, and owl make sounds in front of the palace grounds, it foretells evil to the king and the town.

[*Halakki* is a small owl that flies especially in the moonlit nights and mimicks the human voice.]

64. If birds sit on the doors, festoons, etc. of the houses, if the serpent enters the house, if honeycombs are formed in the houses, they foretell danger to the owner of the house. Bringing of bones, and parts of corpses by the dogs to the house, foretell illness to the members of the house. If cattle enter the village while pulling arrows along with them, this presages destruction of the king of the country.

65. The king can ward off evil effects of the portents of animals and birds by performing festivities and homas. Brahmins should be offered with the dainty food. Land, cattle, and other gifts should be donated liberally.

66. If a pregnant woman gives birth to queer, two, three, four, or more children, the entire clan gets ruined.

67. If cows, buffaloes, elephants, horses, camels, etc. give birth to twins, the mother will die or leave the herd in the next six months. Such animals should be sent away to other countries. Cows, land, gold, etc. should be donated to the Brahmins with humility, devotion, and liberal mind to ward off these evil effects.

68. If living beings except serpents, rats, cows, and fish eat the flesh of their family mates, it foretells drought and famine. If the beasts other than mammals and horses mate with animals of different genes, it ruins the whole country.

69. If healthy cows beat their legs continuously, it causes sickness to the owner. If the cows eat filthy things while bending heads backwards, it brings evil to the owner. If cows shiver without any cause, it presages the threat of thieves. If the cow remains wizened in spite of good feed, it results in loss to the owner. Barren cows giving excess milk cause evil to the owner.

70. Breaking of right molar teeth causes evil to the king; center teeth to the whole country; top teeth to the servants; left molar teeth to the princes; left center teeth to the royal priest; and top teeth of the left side to the ministers. Sudden fall of plants and trees bring eeriness to the entire country.

71. Observation of portents at sunrise and sunset in the *dipta* direction, cracking of the earth in a coarse land, and trembling of the earth foretell tribulations to the subjects. Sudden sight of ogre features causes annihilation of the subjects. The king of the country should perform one crore (10 million) homas to ward off these evil effects.

72. I hereby expound the harmless portentous phenomena, during the six seasons like *Vasanta* (March–May), etc. Halos of sun and moon, earthquake, sudden smoke formation, thunder, crimson color of the sun during sunrise and sunset, sudden dust formation without any wind force, thunderbolt without the formation of thick clouds, exudation of fluids resembling honey and gingelly oil from the trees, off-season flowering, and mating of birds and animals observed in the months of *Chaitra* (March–April) and *Vaishakha* (April–May) in the *Vasanta* season are not harmful.

73. Falling of meteors in dark nights, dust formation, strong wind force, red sky at sunrise and sunset, appearance of flames and smoke without any fire, appearance of rays of the Sun and Moon like two rays, sudden drying of tanks and rivers, and appearance of the sky like the ocean of surging sea waves observed during the months of *Jyeshtha* (May–June) and *Ashadha* (June–July) in the *Grishma* season are not harmful.

74. Formation of the rainbow, appearance of lightning, formation of halos of the sun and moon, sprouting of withered trees, rumbling and cracking of the earth, fissures of hills, falling of houses, and overflowing of rivers, tanks, and wells in the months of *Sravana* (July–August) and *Bhadrapada* (August–September) of the *Varsha* (rainy) season are not harmful.

75. Appearance of the assemblage of damsels, gandharvas, deities, and divine charities, hearing of sounds of music and singing in the mountains and forests, and visibility of stars in the daylight, in the months of *Ashvina* (September–October) and *Kartika* (October–November) of the *Sharad* season are not harmful according to the views of Nandacharya.

76. Distorted cries of birds and animals, dew, coolness of the sun, cool wind, frost, appearance of hills in the forests and lakes, sight of ogres, sight of clothes being wrapped up, and

appearance of rising and setting of sun on the earth, in the months of *Margasira* (November–December) and *Pusya* (December–January) of the *Hemant* season are not harmful, according to the views of Gargacharya.

77. Portents of the wind, birth of queer children to the women, fall of meteors during day or night, abnormal growth of creepers, and appearance of a dark sky in the months of *Magha* (January–February) and *Phalguni* (February–March) of the *Shishir* season are not harmful.

78. The lords of the eight quarters in the order of Indra, Agni, Yama, Nirruthi, Varuna, Vayu, Kubera, and Ishanara rule for a period of half *yama* (one and a half hours) in day and night in that order.

79. The group of the Vayu (wind) asterisms consists of the following – *Ashvina*, *Margasira*, *Punarvasu*, *Uttaraphalguni*, *Hastha*, *Chitra*, and *Swati*. It is called *Vayu mandala* (Wind group).

80. The results of an earthquake in the asterisms of *Vayu mandala* lead to troubles to the artisans, traders, poets, musicians, carpenters, tailors, and other skilled people. Crops get destroyed due to lack of rains in all the countries. It is auspicious for all countries other than Kuru (parts of western Uttar pradesh), Magadha (southern Bihar, now Jharkhand), Dravida (Tamil Nadu), and Kuntala (a large portion of Karnataka).

[Both the text and the commentary are corrupt. This is the amended English translation.]

81. The group of Agni (Fire) asterisms consists of the following – *Bharani*, *Krittika*, *Pusya*, *Magha*, *Purvaphalguni*, *Vishakha*, and *Purvabhadrapada*. It is called *Vaishvanara mandala* (Fire group).

82. The results of an earthquake in the asterisms of *Vaishvanara mandala* are trouble to the countries, viz., Anga (parts of northern Bihar), Vanga (parts of West Bengal and Bangladesh), Kalinga (most of Orissa), Malayala (parts of southern Karnataka and Kerala), Sindhu (Sind in Pakistan), and Dravida (Tamil Nadu). Famine, fever, indigestion, and spasmodic cholera break out. In other countries, kings fight each other due to lack of trust and friendship.

[The text and the commentary are not exhaustive. This is an amended translation.]

83. The group of Indra (king of the deities) asterisms consists of the following – *Rohini*, *Anuradha*, *Jyestha*, *Uttarashadha*, *Sravana*, *Abhijit*, and *Dhanistha*. It is called *Indra mandala*.

84. The results of an earthquake in the asterisms of *Indra mandala* are eeriness to Saurashtra (modern Saurashtra in Gujarat) and Abhisara (a part of Jammu and Kashmir and a part of Northwest Punjab) countries. Many kings will perish. The entire globe gets annihilated being subjected to multiple incurable diseases.

[The text and the commentary are not exhaustive. This is an amended translation.]

85. The group of *Varuna* (lord of water) asterisms consists of the following – *Ardra, Aslesha, Mula, Purvashadha, Shatabhisha, Uttarabhadrapada*, and *Revati*. It is called *Varuna mandala*.

86. The results of an earthquake in the asterisms of *Varuna mandala* are trouble to Videha (modern Tirhut in Bihar), Govardhana (area near Mathura in Uttar Pradesh or the Nasik district of Maharashtra), Cedi (eastern part of Bundelkhand), and Vihara (?) countries. Foes turn into friends. There will be excessive rainfall.

[The text and the commentary are not exhaustive. This is an amended translation.]

87. An earthquake occurring in the *Vayu mandala* asterisms will not cause the evil effects of *Vayu mandala*. An earthquake occurring in the asterisms of *Indra mandala* counteracts one in the *Vayu mandala*. The one in *Agni mandala* nullifies an earthquake in the asterisms of *Varuna mandala*. The mutual opposition of the deities of the *mandalas* balance and counteract their evil effects.

[This relates to the occurrences of earthquakes at the period of intersection of the asterisms.]

88. An earthquake in the asterisms of *Agni mandala* and *Vayu mandala* and vice versa results in the following: dreadful famine, drought, and mass deaths. An earthquake in the asterisms of *Varuna mandala* and *Indra mandala* and vice versa results in the following: good rainfall and plenty of food crops.

89. The effects of earthquakes of *Vayu mandala* are seen immediately; that of *Indra mandala* within a week; that of *Vaishvanara mandala* within a month; and that of *Vayu mandala* within two months. The auspicious results of earthquake will be experienced in the following six months.

End of Chapter IV.

Chapter V – Water divining

1. In this mundane world, water is the most essential part of the entire lifecycle. Hence, I expound the science of water resources hereafter.
2. Worshiping of Varuna as per the *shastras* and digging wells thereafter on the days of the following asterisms yield good amount of water in the well – *Pusya, Uttaraphalguni, Hasta, Anuradha, Uttarashadha, Dhanishtha, Shatabhisha, and Uttarabhadrapada*.
3. In any village, a well, a large tank, or a reservoir should be constructed in the directions like north, etc., excluding southeast and northwest directions, by digging the earth till the water is struck.
4. The location of glossy trees full of long overhanging branches with flowers and fruits touching the ground indicates the availability of water in its vicinity. Location of dried, withered, hollow, pale, and fallen trees indicate the absence of water nearby.

5. The location of a patch of green grass in a grassless place and the location of a grassless patch in a grassy place indicate the pressure of underground spring or treasure.
6. The presence of *Pongamia pinnata* with red colored sprouts, along with the presence of small plants in its basin in red soil indicates presence of astringent groundwater nearby.
7. A rock resembling the color of a dark gem, fig fruit, honey, ghee, cloud, pigeon, collyrium, found at the place of digging a well indicates availability of abundant groundwater at the location.
8. If black soil exists at the place of digging of the well, the water will be astringent; white and blue colored, it will be savory; red mixed with ash-colored soil and gravel, it will be bitter; and white mixed with red, it will be brackish.
9. While digging the well in any one of eight directions of a village, if a rock is found, that would indicate abundant water below. Availability of groundwater in any other direction will be very less.
10. The presence of a greenish clump in a location in a semi-desert area indicates that groundwater is available at a depth of five cubits (1 cubit = approx. 45.7 cm), at a distance of three cubits to its west.
11. Presence of a thorn-less *Prosopis cineraria* tree, an anthill, or a big anthill indicate the presence of groundwater at a depth of five cubits below.
12. The location of smoke arising from the earth, well-grown vegetation, and decomposing of green amaranth plants (*Amaranthus blitum* var. *oleracea*) are indications of the presence of groundwater ten cubits below.
13. If the earth produces a pleasant sound or a light similar to lightning after being struck, if the soil contains white gravel, if any single branch of a tree hangs low touching the ground, these indicate the availability of groundwater at a depth of ten cubits below.
14. The presence of a black plum tree to the west of an anthill in a waterless tract indicates abundant groundwater at a depth of ten cubits, almost two cubits to the south of the anthill.
15. Black soil, gravel resembling the color of a woodpecker or fishes indicates that abundant water exists at a depth of five cubits below.
16. The presence of a well-grown *Vitex negundo* tree along with an anthill nearby indicates availability of good sweet groundwater at a distance of three cubits to the south of the anthill, ten cubits below.
17. Presence of the plants of yellow-berried nightshade (*Solanum surattense*), *bharangi* (*Clerodendrum indicum*), and emblic myrobalan, well grown with glossy leaves, indicates the availability of water at a distance of two cubits to the south of these plants, at a depth of fifteen cubits below.

18. A place where a non-thorny tree is grown in the midst of a thorny thicket and vice versa indicates availability of groundwater at a depth of twenty-five cubits, to its west.
19. A place where jujube tree and flame of the forest tree are growing together, that indicates the availability of abundant groundwater at a depth of fifteen cubits below to its west. Similarly, a place where bael tree and arjun tree are growing together also indicates the presence of abundant groundwater at a depth of fifteen cubits below to its north.
20. The presence of a lone cluster fig tree in a tree-less place indicates availability of abundant groundwater at a depth of fifteen cubits below at a distance of three cubits to its west.

21. The presence of a wild fig tree along with an anthill indicates availability of groundwater at a depth of fifteen cubits to its west. The other indicator is the presence of white gravel at the location.

22. The presence of a pongam tree along with an anthill indicates availability of groundwater to its south. A small tortoise may be seen at the depth of one *munda* (equivalent to two and a half cubits) below.

[Neither the text nor the commentary give the clue to the depths of the groundwater. Similarly one *munda* means the length of person only up to the neck, which is approximately equal to four and a half cubits. The relative reference in Brhat Samhita (Chapter 54, Sutras 33–34) gives the depth of the groundwater as 17.5 cubits, and one *munda* as 2.5 cubits.]

23. The presence of a jujube tree along with an anthill indicates the presence of a lizard at a depth of two and half cubits below to the west of the anthill.

24. The presence of a palmyra palm tree and an anthill to its west indicates availability of groundwater at a depth of fifteen cubits to the west of the anthill.

25. The presence of a frog near or at the foot of any tree in a forest indicates availability of groundwater at a distance of four cubits to its south at a depth of twenty cubits. The other indicators are the presence of greenish, blackish, or whitish soils and presence of a mongoose in that order below the soil.

26. The presence of well-grown palmyra palm and coconut trees along an anthill indicates the availability of groundwater at a depth of twenty cubits below at a distance of six cubits to the north of such trees.

27. The presence of *tilaka* tree (*Wendlandia exserta*), hog-plum tree, *chirabilva* tree (*Holoptelea integrifolia*), bael tree, marking-nut tree, *ankola* tree (*Alangium salvifolium*), siris tree (*Albizia lebbeck*), and emblic myrobalan tree covered with anthills at their foot indicates availability of groundwater at a distance of three and half cubits to the north of these trees at a depth of twenty cubits below.

28. Presence of the following trees or grass in a place devoid of anthills and milky trees indicates availability of groundwater twenty-five cubits below at a distance of two cubits to

their north. These are *Oroxylum indicum*, chebulic myrobalan, asoka (*Saraca asoca*), yellow snake tree, black plum tree, *darbha* grass (sacred grass; *Desmostachya bipinnata*), palma rosa grass (*Cymbopogon martini*).

29. Presence of an anthill to the north of a siris tree or mahua tree indicates availability of groundwater twenty-five cubits below at a distance to the northwest of the anthill. Other symptoms are the presence of white clay, a snake, and black stone at a depth of five cubits below. The water vein will be flowing in the eastward direction.
30. The presence of an anthill nearby to the south of a neem tree indicates availability of groundwater twenty-five cubits below, at a distance of seven cubits to the north of the anthill. Groundwater veins will flow from east, west, and north directions.
31. Presence of an anthill to the east of a banyan tree indicates availability of a clear and saline groundwater source to the south of the anthill, twenty-five cubits below. Other indications are the presence of multi-colored snakes at a depth of five cubits.
32. Presence of an anthill to the northeast of a mustard tree (*Salvadora persica*) indicates availability of groundwater twenty-five cubits below, at a distance of five cubits to the west of the anthill. Other indications are the availability of brown clay and a frog beneath.
33. Presence of an anthill to the west of a kadam tree (*Anthocephalus cadamba*) indicates availability of groundwater with the smell of ferrous verdigris to the south of the anthill fifteen cubits below. Other indications are the presence of greenish soil and snow-white frog five cubits below.
34. A place where tender Bermuda grass, flame of the forest tree, or *darbha* grass grows on an anthill indicates availability of groundwater one hundred and five cubits below the anthill.
35. Presence of an anthill to the north of a *kanchanara* tree (*Bauhinia variegata*) indicates the availability of groundwater source at a distance of two cubits from the anthill seventy-five cubits below.
36. In the above verses where no measurements are mentioned about the distance of location of the groundwater from anthills near the trees, it must be construed as five cubits. This is the rule and observing this rule will result in the success of the endeavor.
37. If rocks are found while digging a well, logs of Indian persimmon and flame of the forest trees should be piled and burned on it. Pouring of the mixture of milk and water breaks the rock instantly.
38. Cook the turbid solution of the burned ash of the logs of the flame of the forest tree or chebulic myrobalan tree and smear the paste on the rock regularly. The rock becomes soft after three days of this continuous treatment.
39. Ferment the well-prepared mixture of buttermilk, liquor, and jujube fruits for seven days. When this fermented liquid is poured on the hot hard rock, the latter breaks and water springs out of the rock.

40. The latex of madar (*Calotropis gigantea*), the dung of pigeon, the dung of mice, and the charcoal made from a ram's horn should be mixed well. Apply this mixture to the edge of a chisel, heat it, and then cool it. Immerse the chisel in oil or buttermilk. This gives hardness to the chisel.

End of Chapter V.

Chapter VI – *Vrikshayurveda*

1. After having realized that 'Vrikshayurveda' is a revered and useful science to all living beings of the universe, I hereby present this treatise of 'Vrikshayurveda' for the due attention of learned people.

2. Sowing of seeds should be undertaken strictly in conformity with the guidelines of the science (*shastras*) in the following asterisms:

Rohini, Mrigasira, Magha, Hasta, Chitra, Vishakha, Mula, and Sravana.

3. A field with a soil of good water-holding capacity should be identified and leveled properly. Seeds should be sown sufficiently deep (for growing annual crops). Pits measuring two cubits in length and breadth, and four cubits in depth should be prepared and filled with manure (for growing trees), and seeds sown in them.

4. The distance between two pits should be maintained such that the branches of the two trees do not overlap each other. The distance of sixteen cubits is superior; fourteen is moderate; and ten is inferior.

5. Five varieties of soils and organic manures should be filled in the pits to the brim. This is called *bhumi samskara* or soil preparation, according to the wise.

6. The seed treatment prior to the sowing is as follows:

The seeds of a naturally ripened fruit is to be collected, mixed well with cow dung and dried (in shade) for five nights (and days). This has to be soaked in milk for seven days. Afterwards, it has to be coated with the mixture of Indian nightshade (*Solanum indicum*) fruit juice and salt water. This coated seed is to be fumigated with the powder of *vidanga* (*Embelia ribes*) seeds and ghee.

7. Such treated seed should be sown in the pits at auspicious timings (*muhurtas*) and auspicious ascendants. The pits have to be sprinkled with *kunapa* (fermented liquid prepared from flesh, etc.) water. Such seeds will sprout and grow well.

8. Such newly sown plants should be watered twice in the morning and evening regularly in summer. The moisture content of the soil should be observed in rainy and winter seasons and watering done accordingly.

9. During the first year of planting (or sowing), the plants should be protected from hailstones, thunderbolts, summer heat, fire, insects, and birds. Weeds grown around the plants should be removed regularly during this period.

10. The plants should be sprinkled with curd rice for protecting them from hailstones. Plants have to be fumigated with the ash of a tree burned by a thunderbolt for protecting them from the frost. Fumigation of the plants with fish meat, mustard, and plantain leaf helps them to grow vigorously and stoutly.

11. Mix the following powders and ferment them for one week in cow urine:

Asafetida resin, sweet flag roots, *atis* (*Aconitum heterophyllum*) root, black pepper, *vidanga*, marking-nut seeds, *indrayan*, mustard, and cow horn. Sprinkling of this solution around the plant destroys the insects.

12. Fumigation of trees with mixture of the powders of following ingredients makes them disease-free. They also bear abundant fruits. The ingredients are *vidanga*, Indian bdellium, fish meat, turmeric, mustard, and arjun flowers.

13. If shoots or branches are broken, wounded, bleached, or dried, it indicates a disease has affected the tree. The diseased parts should be smeared with hot ghee and filled or pasted with *vidanga* powder and black soil (soil mixed with organic manure or humus). The tree gets cured and grows well.

14. Application of the decoction of ground Indian dill leaves or sprinkling of goat meat juice enables the tree to sprout and grow well.

15. By cooking barley, greengram, and blackgram in goat's milk and application of this solution to the tree helps the tree to be glossy and attractive with full of leaves, flowers, and fruits.

16. If the above treatment is followed regularly, the tree will be flushed with branches, leaves, flowers, tender fruits, unripe fruits, and mature fruits. The tree will be full of fruits throughout the year and will please everyone with its beauty.

17. Transplantation of various types of plants is done as follows.

The well-grown trees have to be transplanted in winter (*Mrigasira-Pusya* or December–January); that with fruits in the rainy season (*Sravana-Bhadrapada* or August–September); and the young trees in the post-winter (*Magha-Phalguna* or February–March). The plants transplanted as above grow vigorously in an astonishing manner.

18. The pre-transplantation procedure is as follows.

The trees should be worshiped as per the *shastras*. The tree should be anointed with the ground paste of cow dung, milk, *vidanga* seeds, ghee, honey, vetiver roots, and sesame taken in equal proportion, and later uprooted. The roots of the tree should be anointed with the same paste and replanted at the new place. Again the tree should be anointed with the same paste at the new place soon after replanting. During the entire period of this operation, auspicious music of pipe and drums should be played enthusiastically and continuously. The replanted tree should be watered regularly.

19. Regular application of the mixture of deer meat, pork, *ankola* (*Alangium salviifolium*) seed powder, ghee, and honey to any tree helps in quick sprouting of leaves, blossom of flowers, and fruiting. The tree will also look attractive.
20. When it is impossible for Brahma (the creator) to describe the beauty of such a garden with trees of attractive features, abundant fruits, and pleasing sight with the above treatment, will it be possible for others to describe it?
21. For raising attractive plants of pomegranate, jack fruit tree, yellow snake tree, black plum tree, asoka, plantain, wild jasmine, *madhavilatha*, citron, and other trees and climbers, the seeds or the boughs should be coated with cow dung and sown later in the pits for a better establishment of their root system and vigorous growth.
22. A method of grafting is as follows:

Take two different species of boughs or seeds. Cleave and join them again. Anoint honey and ghee to the grafted bough or the seed and plant the same immediately. When this grafted plant is well grown, it will have a different root bough and fruit bough.
23. Anoint the rhizomes of Indian lotus and Indian red waterlily with ghee and honey and graft them together and plant the same. Regular sprinkling with the juice of the flesh of deer results in blossoming of different types of flowers with a common rhizome.
24. Prepare the soil well and sow the seed of any tree in it (making pits as given in verses 3, 4, and 5 in this chapter). Application of the boiled and cooled mixture of pork juice and milk assists the seed to sprout 'immediately' and become glossy with abundant leaves, flowers, and fruits.
25. For making a mango tree to fruit throughout the year, prepare a mixture of pork juice, sage-leaved alangium seed juice, milk, honey, and ghee, and regularly apply it to the tree basin.
26. For making a sour-fruit bearing mango tree to bear sweet fruits, prepare a decoction of the shoots of fig tree, banyan tree, jack fruit tree, *plaksha* (*Ficus lucescens*), pipal, and the marrows of wolf, hog, deer, oxen, or jackal, and regularly apply the decoction to the tree basin.
27. To get a pleasant aroma in mango fruits, regularly apply the decoction prepared from the powders of the rhizomes of nut grass, vetiver roots, and black plum fruit to the tree basin.
28. For making a plantain tree to yield big-sized fruits, heat a needle in the fire of the mixture of the dung of horse and wild boar, and pierce the hot needle at the location from where the fruit cluster arises.
29. For making the plantain tree yield big-sized fruits similar to the ivory tusk, bury the rut of an elephant in the monkey skull or hog teeth in the basin of the tree.

30. For making the plantain tree to yield big-sized fruits in the shape of pomegranate fruits, regularly apply the mixture of the juice of sage-leaved alangium seed, pork, and blood of the hog.
31. When a well-grown jack fruit tree is covered with paddy grass from the bottom, to the top, the fruits arise from the bottom.
32. For making the coconut tree yield abundant fruits, regularly apply the ground mixture of sesame, agati sesbania seeds, *vidanga*, and rock salt, with honey and liquor to its roots in the evening.
33. For making a barren sweet orange tree to yield abundant fruits, regularly apply the decoction of jaggery (from cane sugar), meat, and milk to the basin and anoint or fumigate the tree with hare dung.
34. For making a citron tree to yield abundant fruits, regularly apply the mixture of fish marrow, flesh of wild cow (native kind which do not allow the milk to be milked by humans), agar tree resin, and emblic myrobalan cake (or oil cake) to the basin. Alternatively, fox meat can also be applied regularly.
35. For getting big-sized pomegranate fruits regularly, apply the balls (or even small tablets) prepared from a well-ground mixture of goat dung and flesh of a male fox.
36. For making a tamarind tree to have a luxuriant growth, apply ground powder of paddy, barley, sesame, and blackgram well mixed in flesh to the plantings.

[Flesh of any particular animal is not mentioned in the text or the commentary; we may consider it as pork.]
37. For making jujube tree to yield delicious fruits abundantly throughout the year, regularly apply a well-ground mixture of water, honey, ghee, licorice, and sesame.

[Ground mixture except water can be kept in stock, so that water can be mixed at the time of application.]
38. For making the bael or neem tree to yield big-sized and splendidous leaves throughout the year, apply mixture of jaggery (from cane sugar), honey, milk, and ghee to the basin.
39. For making a barren emblic myrobalan tree to bear abundant fruits, split a branch of tree with an axe and fill the mixture of sesame, honey, and ghee, and join both the parts by tying together with ropes.
40. For making any tree to yield seedless and sweet fruits, bury the mixture of licorice, flowers of butter tree, honey, sugar, and costus roots in the basin around the tree base.
41. To retain semi-ripened fruits on one branch of any tree for a long time while allowing the fruits to ripen on other parts of the tree, one should cover that particular branch with seven layers of the skin of a goat or black oxen on a day of *Pusya* asterism.

42. Asoka trees when kicked by excellent women with their left leg applied with red lac dye yield a very rich blossom. Spanish-cherry tree, after being sputtered with mouthful of wine by excellent women, yields splendorous and abundant flowers. The sight of beautiful and virgin girls protects the ironwood tree. Mango tree and *priyangu* creeper (*Callicarpa macrophylla*) yield fruits in abundance after being wedded.

[Wedding between a creeper and a tree means, the climber must be allowed to grow on that tree.]

43. Asoka tree blossoms on all its branches after being fed with the two mixtures, viz., pounded fried sesame and liquor, liquor and honey, in that order.

44. The ironwood tree and Spanish-cherry tree blossom throughout the year if fed regularly in the morning with water mixed with milk, flesh, blood, and crushed juice of the shoots of mango, black plum, or wood-apple, lemon, and bael trees.

[The shoots of these five trees are called *panch pallava*.]

45. To make a champac tree blossom with bunches of flowers, regularly sprinkle an infusion made from the powder of deodar seeds, turmeric, liquor, long pepper, arecanut, white mustard, neem fruits, sweet flag rhizomes, and jequirity seeds in water.

46. Regular application of the decoction of the shoots of black plum tree, vetiver roots, nut grass rhizomes, and liquor to any flowering plant or tree, gives profuse flower bunches.

[This verse is not available in the original text or the commentary of the printed edition. This translator assessing the sequence of the verses adds it.]

47. Screw-pine shrub blossoms with fragrant flowers if dog's meat is placed in the basin followed by regular sprinkling of the suspension made from white sandalwood paste.

48. Planting of jasmine(s) branches in a well-prepared soil, at a place where hay was burned, hastens flowering.

49. When yellow jasmine and common jasmine are applied with the decoction of agar wood and Indian lotus rhizomes, their flowers interchange their fragrances.

50. Application of horseflesh to the *kuranta* (*Barleria cristata*) plant averts fading of its flowers. Application of liquor (made from sugar) and buffalo milk to the shoe-flower plant in the night produces white flowers in the morning.

51. Application of fragrant substances to soil, in which a malodorous flowering plant is growing, and later regularly watering the same with water mixed with cow dung bestows fragrant smell to the flowers.

52. To obtain fragrant Indian lotus flowers, anoint the ground paste of elephant ivory with the powder of chickpea to the lotus rhizomes.

53. For making the grapevine to yield abundant fruits, smear the vine with dung of the cock or its decoction.

54. The physic (purging) nut plant (*Jatropha curcas*) yields nuts similar to the size of bitter gourd after it is watered with the decoction of pork and sage-leaved alangium seeds.

55. The fresh seed of brinjal should be put along with ghee into a red gourd after boring a small hole in it, while it is in immature state on the plant (climber). Cover the red gourd and allow it to ripen naturally. The seeds should be removed from the ripened red gourd and sown in pits. The red gourd plants grow and yield brinjal.

56. Plant the nodes of any climber and go on cutting the well-grown rhizomes (roots) continuously up to the seventh planting. The climber of the seventh planting yields seedless fruits.

57. To make any climber to bear fruits throughout the year, apply the decoction of the sage-leaved alangium seeds, flowers of shiranjitea, and flesh.

58. To get abundant fruits of any climber, either smear the ointment of soot and cow ghee, or pierce the 'scorpion sting' into the root. Alternatively, bury the mixture of pork and dead nut (?) in its basin.

59. A climber regularly applied with the mixture of the flesh of a python, a hog, goat urine, and milk yields plentiful fruits that will satisfy the hunger of many people.

60. Regular application of a mixture of one *balla* of barley, four *kolagas* of black sesame, two *ballas* of goat dung, and one *kolaga* of beef fermented for seven days, to any plant, thicket, or a climber results in fruiting throughout the year.

[*Kolaga* and *balla* are the measures by volume of the eleventh century. Grains were measured in terms of *kolaga* and *balla*. One *kolaga* is equal to four *ballas*. This is similar to *adhaka* and *drona*, where one *drona* is equal to four *adhakas*.]

End of Chapter VI.

Chapter VII – Perfumes

1. I hereby expound the technology of perfumes, which will be beneficial to all the living beings (persons) in their life.

2. To obtain the aroma of Spanish-cherry (*bakulah*) flowers, add the ground pastes of sandalwood and costus roots mixed together. To obtain the aroma of the trumpet flower, add the ground pastes of costus roots, heartwood of bastard teak, and sandalwood mixed together. To obtain the aroma of the *kadamba* (Kadam) flowers, grind black pepper, cinnamon bark, and sandalwood together. To obtain the aroma of champac flowers, grind an emerald, cardamom, and sandalwood mixed together. To obtain aroma of the flowers of Indian red waterlily, grind

the flowers of Indian lotus, leaves of patchouli, male flowers of screw-pine, and sandalwood mixed together.

3. Tooth powder:

The process of making herbal tooth-sticks is now described.

Prepare a cold infusion or a decoction of the bark of any one of the trees, chebulic myrobalan, belleric myrobalan, or siris. [Alternatively, the external bark of chebulic myrobalan, belleric myrobalan, and siris can also be used.] The decoction or the infusion will be astringent in taste. Add the following products to this decoction and prepare a mixture; these are powders of Indian bdellium wood, arecanut, sweet flag, and cinnamon. [A separate decoction of these materials can also be made and added to the first decoction.] Put the tooth-sticks in this final solution for about one week. [The duration is not mentioned in the text or the commentary.] Then dry the tooth-sticks preferably in shade. These tooth-sticks give sturdiness to the teeth of those persons who use them.

4. Mouth freshener:

The process of making herbal liquid mouth freshener is now described.

Take the powders of the following ingredients in equal proportion: dried ginger, black pepper, long pepper, nut grass rhizomes, cinnamon, cinnamon leaves, cardamom, catechu, coriander, and honey. This mixture can be used as a mouth freshener by adding it to water and rinsing the mouth to have good mouth odor.

[The proportion of water and the mixture is not given. It can be taken as 10:1 or even 20:1.]

5. A common perfume can be prepared as follows:

Prepare a mixture of the powders of the following ingredients in equal proportion – nut grass rhizomes, cardamom, clove, sandalwood, nardus root, male flowers of screw-pine, and ironwood flowers. A decoction of this mixture is a ‘common perfume’.

6. Aerosolized perfume can be prepared as follows:

A fresh fragrant flower or its juice can be mixed with the common perfume (described above) to get the perfume of the desired flower. Alternatively, sandalwood can be ground in the juice of the desired flower. This ‘personal perfume’ can be anointed over one’s own body.

[If the perfume of jasmine flowers is required, add jasmine flower juice to the common perfume and use it. Alternatively, grind the sandalwood in the jasmine flower juice.]

7. An excellent perfume – it can be prepared thus.

Prepare a mixture of the powders of the following ingredients:

Camphor – 9 parts, Indian bdellium – 1 part, kamala tree powder – 3 parts, musk – 1 part, clove – 1 part, costus roots – 1 part, and bay (tree) oil – 3 parts.

Add this mixture to sandalwood paste (or powder). This is an excellent perfume.

[Kamala powder – This is the powder of glandular hairs of the fruit of the kamala tree. Today's *kumkum* of trade is an artificial product which is not a substitute for this product. Instead of kamala tree powder, saffron can also be used. Annatto dye can also be used as an alternative to kamala tree powder. Bay oil is an essential oil obtained from the green leaves of the bay tree (*Pimenta racemosa*), which is claimed to have originated in West Indies and tropical America.]

8. A facial perfume – a herbal facial perfume can be prepared thus.

Bore a hole in a citron fruit and fill it up with the common perfume. Cover the citron tightly and put it in a 'crucible' (mild fire-pit). Take out the citron fruit upon its refinement. The final product is a facial perfume called *mukhavasa* [in Kannada and Sanskrit]. This perfume gives a good facial fragrance.

9–10. A lovely facial perfume-cum-mouth freshener tablet:

The preparation of tablets of a lovely perfume-cum-mouth freshener is explained below.

Prepare a mixture of the powders of the following ingredients, one part each:

Sandalwood, kamala powder, agar, *renuka* (*Piper wallichii*), nutmeg, East Indian arrowroot (*Curcuma angustifolia*), musk, sugar, and mace.

Camphor – 4 parts; bay oil – 4 parts; catechu – 16 parts.

Mix all these ingredients well by triturating them and prepare small tablets by using *sahakara taila* as the base.

[These tablets are called *khaira gulige* in Kannada.]

Preparation of *sahakara taila* is explained in the next verse.

11. *Sahakara taila*:

The preparation of *sahakara taila* is given below:

Take equal parts of the leaves and bark of citron, *nayinerale* (*Syzygium cerasoides*), bael, mango, and Indian bdellium tree. Prepare a decoction of these by boiling and reducing to one-eighth of its original volume. Add equal proportion of mustard oil to this decoction. Add the bark juice of *bhutankusa* tree (*Croton oblongifolius*). Fumigate this liquid mixture with the bay tree leaves. This is called *sahakara taila*, a general purpose oil.

12. To prepare any particular fragrant oil, mix one part of the raw perfume with four parts of sesame oil and sixteen parts of water. Boil this mixture till the water evaporates.

13. To remove any impurities of the oil, add any one of the following:

Indian olibanum, Indian bdellium, *kananashekha* (*Ornocarpum cochinchinense*) leaf juice, and Indian arrowroot powder.

14. Golden oil:

Add Indian lotus flowers, licorice, turmeric, *renuka* (*Piper wallichii*) fruits, and thorn apple (*Datura stramonium*) bark in equal proportion to the oil (sesame?) prepared as above. Mix them well and heat it again till the oil gets a golden color.

15. Red oil:

Add the powders of lac, asafetida, Indian madder roots, red sandalwood, *nakha* [flowers of henna (*Lawsonia inermis*)], and bonduc nut (*Caesalpinia crista*) (bark or nut), in equal parts to the oil prepared above and boil the same till the oil becomes dark red.

16. *Champaka taila* (for use by kings):

Add three parts of screw-pine male flowers, one part of costus roots, two parts of cinnamon, and ten parts of cinnamon leaves to 128 parts of sesame oil.

17. After heating this oil in sunlight for seven days, add champac flowers everyday to intensify fragrance. This is called *champaka taila*, which is good for use by kings.

18. Trumpet flower oil (*padari taila*):

Add powders of one part of crape-jasmine roots, two parts of agar, three parts of cinnamon, four parts of patchouli leaves, five parts of *bharundi* (*Heliotropium indicum*) leaves, six parts of costus roots, and seven parts of *danti* (*Baliospermum montanum*) seeds to sesame oil and heat it in the sun. Add fresh trumpet flower to this oil. The resultant oil is called the trumpet flower oil (*padari taila*).

[The procedure described for *champaka taila* can also be followed.]

19. Crape-jasmine oil:

Mix the powders of one part of crape-jasmine roots, one part of cinnamon, one part of nardus roots, one part of male flowers of screw-pine, one part of cardamom, one part of arecanut, one part of rose apple leaves, one part of *renuka* (*Piper wallichii*) fruits, one part of costus roots, one part of cowhage roots, eight parts of vetiver roots, and eight parts of deodar wood.

20. Add this mixture to sesame oil and boil it using low heat. Add the fresh crape-jasmine flowers to this oil upon cooling. This is called *jagi taila* (crape-jasmine oil).

21. Jasmine oil:

Add the powders of one part of cowhage roots, one part of costus roots, one part of cowhage seeds, one part of clove, one part of cardamom, one part of whole plant of purple fleabane, one part of male flowers of screw-pine, two parts of rose apple tree bark, three parts of nardus roots, three parts of crape-jasmine roots to sesame oil and boil the same. Add fresh jasmine (*Jasminum sambac*) flowers to the oil upon cooling. This is called *mallika taila* (jasmine oil).

22. Oil of any particular fragrant flower:

Remove the black coat of sesame seeds by rubbing on a stone slab. Wash with water and dry the seed. Add any particular fresh flower to this dried white sesame and put the same into an oil press drawn by bullocks. Collect the oil and again add the fragrant flowers to the oil. This oil is the fragrant oil of the particular flowers.

23. *Mragamada taila* (musk oil or *kasturi taila*):

Add screw-pine male flowers to white sesame seeds and fumigate the same with the mixture of powders of rosin, ferrous powder (ferric oxide), zedoary rhizomes, nardus roots, arecanut, and cardamom.

24. Add camphor, kamala wood powder (or saffron), musk, sandalwood powder, chebulic myrobalan powder, belleric myrobalan powder, emblic myrobalan powder, lodh tree (*Symplocos racemosa*) bark (or leaves) in equal parts to the fumigated sesame seeds (see above) and extract the oil from an oil press. Heat the scented oil in sunlight for seven days. This is called *mragamada taila* or musk oil.

25. Camphor oil:

Grind mature and well-dried seeds of bael fruits and make a dough. Dry this dough in shade. Add this dried dough to water and boil the same. Extract the oil by allowing the water to evaporate. Camphor oil is obtained by adding camphor to this oil.

26. Scented camphor oil:

By keeping the camphor oil in a closed jar fumigated with the powdered mixture of deodar, honey, unrefined sugar, *bharangi* (*Clerodendrum indicum*) leaves, agar, and bael leaves, a scented camphor oil is obtained.

27. Scented Indian gooseberry:

Grind one part of *mura* (*Erythrina stricta*) bark, one part of Indian bdellium, one part of sweet marjoram leaves, one part of nardus roots, one part of bonduc nut, and fifteen parts of emblic myrobalan (Indian gooseberry) in rice gruel and make it into a fine paste. Add cardamom and cinnamon powders to this paste and allow it to ferment for a day. Fumigate this gruel with jaggery (from cane sugar). This is called 'scented Indian gooseberry'.

28. Grind the powders of one part of sweet marjoram leaves, one part of whole *damanaka* plant (*Artemisia nilagirica*), one part of patchouli leaves, one part of *bharundi* (*Heliotropium indicum*) leaves, one part of crape-jasmine roots, one part of zedoary roots, one part of cardamom, and twenty-one parts of emblic myrobalan seeds in rice gruel and make it into a fine paste as above. Add cardamom and cinnamon powders to the paste and ferment it for a day. Fumigate this paste with jaggery (from cane sugar). This is also called 'scented Indian gooseberry'.

29. Body perfume:

A mixture of the powders of *nakha* (henna?), Indian olibanum, nardus roots, and sweet marjoram leaves, in equal parts, is an excellent body perfume.

30. Raiment perfume:

A mixture of the powders of sandalwood, agar, unrefined sugar, bonduc nut, seeds of pongam (*Pongamia pinnata*), and costus roots, in equal proportion, is called the 'raiment perfume'. This perfume can be sprinkled over clothes. Alternatively, clothes may also be fumigated with this perfume.

31. Incense sticks (*agarabathi*):

A mixture of the powders of two parts of musk, one part of camphor, one part of ferrous sulfate, one part of Indian olibanum, one part of sandalwood, and one part of nardus roots should be mixed in 14 parts of sugar solution and incense sticks prepared with this dough and dried in shade. Sesame oil should be sprinkled on these incense sticks. The incense sticks give a fragrant odor when lighted.

32. The mixture of powders of sandalwood, Indian olibanum, nut grass rhizomes, *nakha* (henna?), arecanut, Indian bdellium, bonduc nut, cinnamon, and male flowers of screw-pine, in equal parts, should be ground, made into a dough, and incense sticks prepared. These are also incense sticks, which produce a fragrant smell when lighted.

33. Prepare a mixture of the powders of deodar wood, bonduc nuts, *mura* (*Selimum wallichianum*) bark, sal dammar, ferrous sulfate, and lac in equal proportions. Fill this mixture in small cotton packs. This cotton pack is called *sugandhamaya dhupa varti*, i.e., 'incense pack'. This incense pack produces a fine fragrance when lighted.

34. Prepare a mixture of the powders of sandalwood, *bharundi* (*Heliotropium indicum*) leaves, male flowers of screw-pine, unrefined sugars, lac, and costus roots in equal proportion. Fill this mixture in small cotton packs. This cotton pack produces a fragrant smell when lighted.

35. *Dasanga dhupa* (incense of ten perfumes):

Prepare a mixture of powders of agar, nut grass rhizomes, *bharundi* (*Heliotropium indicum*) leaves, nardus roots, *nakha* (henna?), sweet marjoram leaves, roots of bonduc tree, roots of cowhage, male flowers of screw-pine, and sandalwood in equal proportion. Add honey and sugar to this mixture and prepare small tablets with the dough. This is called '*dasanga dhupa*', i.e., 'incense of ten perfumes'.

36. *Panchanga dhupa* (incense of five perfumes):

Prepare a mixture of the powders of one part of *nakha* (henna?), two parts of camphor, three parts of agar, four parts of sandalwood, and five parts of the pulp of bael fruits. This mixture is called '*panchanga dhupa*', i.e., 'incense of five perfumes'.

37. Divine perfume:

Prepare a mixture of the powders of sandalwood, *bharundi* (*Heliotropium indicum*) leaves, male flowers of screw-pine, unrefined sugar, agar, and costus roots taken in equal proportion. Add jaggery (from cane sugar) to this final mixture and prepare oblong tablets. This is called 'divine incense' and is amiable to all gods.

38. Diffusive perfume:

Two types of diffusive perfumes are given here. The first one is a mixture of the powders of lac, nut grass rhizomes, *bharundi* (*Heliotropium indicum*) leaves, outer part of chebulic myrobalan fruits, jaggery (from cane sugar), flowers of Indian butter-tree (*Diploknema butyracea*), in equal proportions. Prepare tablets from this mixture. The second one is the mixture of the powders of lac, jaggery (from cane sugar), and outer part of belleric myrobalan nuts in equal parts. Tablets of these two mixtures give a pleasant fragrance when lighted.

39. Incense for dissipation of bugs and other insects:

The mixture of the powders of sandalwood, *vidanga* (*Embelia ribes*) seeds, flowers of arjun tree, along with jaggery (from cane sugar) and honey dissipate flies, gnats, bugs, and bats from the house when fumigated with it.

40. Desired perfume:

Collect the roots of ironwood tree, wash it well with water, and dry the same. Mix the powder of this root and the pulp of its seed. Add the desired perfume to this powder (see verse 6 of this chapter). Later fumigate this perfumed mixture with chebulic myrobalan seeds. Thus the powder of the desired perfume is obtained.

41. *Bakulah* flower fragrance:

Prepare a mixture of the powders of sandalwood, bark of black plum tree, bark of bael tree, Indian dill (whole plant), and bark of chebulic myrobalan nuts in equal proportions. Any fragrant flower will give the fragrance of *bakulah* (*Mimusops elengi*) flowers when sprinkled with this mixture.

42. *Champaka* perfume:

Prepare a mixture of powders of, one part each, of Indian rosebay wood, sandalwood, male flowers of screw-pine, and agar and sixteen parts of Indian bdellium. Any fragrant flower will give the fragrance of champac flower when sprinkled with this mixture.

43. Fragrance of screw-pine flowers:

Prepare a mixture of the powders of sandalwood, roots of drumstick tree, male flowers of screw-pine, nut grass rhizomes, bark of chebulic myrobalan nuts, nardus roots, jaggery (from cane sugar), and cardamom in equal proportion. Any fragrant flower will give the fragrance of the male flowers of screw-pine when sprinkled with this mixture.

44. Fragrance of *chandra mallika* (*sevantige*):

Prepare a mixture of the powders of one part of sweet marjoram leaves, one part of cinnamon, two parts of Indian olibanum, and four parts of coriander. Any fragrant flower will give the fragrance of *chandra mallika* flower, when sprinkled with this mixture.

45. Jasmine fragrance:

Prepare a mixture of the powders of one part of the roots of Indian rosebay tree, two parts of chebulic myrobalan nuts, three parts of cinnamon, and four parts of cinnamon leaves. Any fragrant flower will give the 'jasmine fragrance' when sprinkled with this mixture.

46. Retaining fragrance of the flowers:

Prepare a mixture of the powders of the seeds of Indian laurel, flowers of Indian persimmon, borax, camphor, and Indian bdellium in equal parts. The fragrant flowers will retain their fragrance intact after being sprinkled with this mixture.

47. Spraying of a mixture of honey, juice of the roots of false pareira root (*Cissampelos pareira*), and camphor in proper proportions on any fragrant flower releases the sap and retains its fragrance.

48. Prepare a $1/16$ decoction of the powdered roots of drumstick tree and add honey and camphor to it. Smear the mixture to the inner walls of a bowl and keep the male flowers of screw-pine in it and heat the bowl in inert fire. The flowers emit their sap but retain their fragrance.

49. Prepare a ground mixture of agar, sandalwood, kamala powder, musk, and *granthiparni* seeds (or leaves) (*Leonotis nepetaefolia*). Prepare small tablets and dry them in shade. When any substance is fumigated with this tablet, it will get a fragrance superior to that of the musk.

50. *Sadu*:

Grind the farina of Indian lotus flowers, costus roots, bael roots, arjun flowers, monkey jack fruits (*Artocarpus lakoocha*), and honey. Keep the resultant paste in a tightly sealed lac vessel and bury it underground for two months. This will give a superior quality of perfume called *sadu* [in Kannada].

51. Take one part each of jaggery (from cane sugar) and deodar oil. Mix them in eight parts of the juice of the roots of drumstick tree. Boil this liquid by reducing the same to one-third of its quantity. Add cinnamon and cardamom powders to it. This is another *sadu*.

52. Grind two parts of musk, one part of agar, one part of the oil of bael tree bark, one part of the juice of the whole plant of maidenhair fern (*Adiantum capillus-veneris*), and one part of sandalwood in hot water.

53. Fill the above paste in the outer skin of citron fruit and bake the paste till the shell is well burned. The baked paste will have a fragrance better than camphor and fit to be used as a body perfume.

54. *Udayabhaskara sadu*:

Grind one part of musk, two parts of sandalwood, three parts of male flowers of screw-pine, four parts of agar, and five parts of *nakha* (henna?), and bake the final paste. Add honey and sugar to the baked paste and fumigate the same. This is called *udayabhaskara sadu*.

55. *Mahisidala sadu*:

Grind one part of Indian bdellium, two parts of *shali* (long duration, transplanted) rice, three parts of sandalwood, four parts of agar, five parts of kamala powder, six parts of the whole plant of purple fleabane, seven parts of *bharundi* (*Heliotropium indicum*) leaves, eight parts of ironwood flowers, all together, and make small balls and dry them in shade. Mix the balls in the sap of any flower by trifurcation. Bake this ball in a citron shell (as explained in verse 53). Add musk to the final product. The resultant product is called *mahisidala sadu*, i.e., a perfume for the queen.

56. Take Indian barberry bark, pulp of wood-apple, roots of Indian lotus, and bark of *varunah* (*Crataeva nurvala*) tree, cut them into small pieces, and dry them in shade. Cook these dried products (in equal parts) in the leaf decoction of jack fruit tree, fig, banyan, pipal, and *pilkhan*.

57. Grind the above cooked product with the juice of a flower into a smooth paste. Bake this paste as stated earlier (see verse 53). Add Indian bdellium, ferrous sulfate, and dung of goats to this baked paste. Fumigate this final product and add the perfume of a fragrant flower. This is another *sadu*.

58. Take the oils of tree barks of chebulic myrobalan, screw-pine, sal dammar, bael, agar, deodar, Indian bdellium, Alexandrian laurel, and Indian olibanum separately and fumigate them with jaggery (from cane sugar).

59. The quantum of jaggery (from cane sugar) should be four times in the rainy season and eight times in winter. This will give a very high quality *sadu*.

60. Instead of jaggery (from cane sugar), the above oils (see verse 58) can also be fumigated with lac, chebulic myrobalan, Indian bdellium, nardus roots, male flowers of screw-pine, *nakha* (henna?), sal dammar, agar, sandalwood, sweet marjoram leaves, camphor, musk, sugar as well as honey. Such oils will also have good fragrance.

61. *Kumkum*:

Grind two parts of any fragrant flower along with one part of arjun flowers and one part of male flowers of screw-pine and dry the paste in sun. Add equal proportion (4 parts) of the pollen of sandalwood flowers to it and mix them well. This is *kumkum*.

62. *Kumkuma kesari* (saffron):

Wash fresh flowers of safflower with good quality curd (buttermilk?). Perfume these washed flowers with any perfume (see verse 6). Dry these flowers (in shade) and boil the same in the juice of catechu and (common) algae. Later bake the same (see verse 53).

63. Again bake the product in the shell of bael fruit. Mix the end product with one-sixteenth part of *kumkum*. The resultant product is called *kumkuma kesari*.

64. Musk (*kasturi*):

Grind one part of camphor, one part of musk, one part of agar, one part of cinnamon, one part of nutmeg, and four parts of bonduc nut seeds in honey.

65. Add the juice of a fragrant flower, juice of *kananashekhar* (*Ormocarpum cochinchinense*) leaves, and goat urine. Boil this liquid and add fragrance with the male flowers of screw-pine (see verse 5). Fill this final product in a metallic box (preferably gold, silver, or brass) and bury the box in a grain heap (rice?) for two days (two to four weeks – translator). The resultant product is the musk.

66. Crude camphor:

Wash borax with hot water, rice gruel, and buffalo milk in that order. Again wash it with the juice of the screw-pine. Each time the washed borax should be dried in the sun.

67. Place this washed and dried borax in a bag made from the bark of Indian birch and immerse it in boiling milk to get the borax hot. Take out the contents from the bag and add one-fourth quantity of good quality camphor to it. The resultant is the crude camphor.

68. Asafetida:

Prepare a mixture of two parts of garlic, one part of asafetida, one part of gum of the neem tree, one part of butter from goat's milk, and one part of neem oil. Boil this well prepared mixture till the water evaporates. The final product is the *hing* or asafetida.

69. Edible asafetida:

Grind a mixture of three parts of asafetida, one part of ginger powder, two parts of jaggery (from cane sugar), and five parts of the pulp of castor seeds in goat milk. Add the juice of a flower and boil the same. The final product is the edible asafetida.

70. Commercial asafetida:

Take two parts of garlic, one part of ginger powder, six parts of bael fruit pulp, one part of camphor, one part of jaggery (from cane sugar), and eight parts of blackgram flour. Grind

these ingredients in goat's milk and add the juice of any fragrant flower. Fill this product in the shell of a bottle gourd and bury the same inside a paddy heap for one month. The resultant product is the commercial asafetida.

End of Chapter VII.

Chapter VIII – *Supa shastra* (The art and science of cookery)

1. Our ancestors have said that food is life. Accordingly, I hereby expound the science of cooking for people's welfare.

2. Properly cooked rice:

To prepare properly cooked rice, first wash the cleaned raw rice in clean water three times. Cook this washed rice in boiling water. Pour off the excess pap, if any, to have properly cooked rice. If this cooked rice is too soft, add the rice pap and again pour off the excess pap. This will give good cooked rice.

3. Preserving cooked rice:

Prepare a decoction of the leaves of sacred basil (*tulsi*) and citron. Alternatively mix the burned ash of the bark of common guava tree (?) to water, allow the solution to settle and strain it off. Take any one of the solutions and boil the same. Cook the washed rice in this boiling water and prepare properly cooked rice. Add curd to this cooked rice in equal proportion. This food will last for a long time without being spoiled or decomposed.

4. Prepare a *payasa* (sweet porridge) in cow's milk with greengram and hand pounded brown rice (usually the hand pounded rice is reddish or brownish in color) in an urn. Keep this urn with *payasa* in cold water up to its neck. One who eats this *payasa* will not be hungry till this *payasa* lasts (?).

[Usually brown rice is called *doddu bhaira nellu*, which is grown under dry conditions (dryland farming). It has more starch than the usual rice, and it is also very sweet. One cannot even consume large quantity of cooked rice. This is called *kalave akki* in Kannada.]

5. Soak cleaned barley in milk and dry it in the sun. Roast this dried barley and grind it into fine flour in a stone mill. Add the powders of saffron, cinnamon, cinnamon leaves, and cardamom to it. Mix this flour with sugar or ghee. This is a very highly nutritional food.

[Even today many people prepare *rave unde* in this way as a common dish during many festivals and ceremonies.]

6. Soak cleaned barley in hot milk and grind it into a paste. Fry the small balls of this paste in ghee. This is called *ghrta pureta*, i.e., ghee-fried ball. This is very delicious and is also called 'ambrosia food'.

[It is called *appam* in Tamil and *kajya* in Kannada.]

7. Soak a soft and hot *mandige* in a mixture of hot milk and ghee. Add the powders of saffron, cinnamon, cinnamon leaves, cardamom, and sugar along with the water of tender coconut to this *mandige*. Mix all ingredients properly and keep it in an urn. Seal the urn with a thick mud coating and place this sealed urn in the midst of a fire around it. Take out the cooked material from the urn. This is called *khandaghrta pura*.

[*Mandige* is cooked flour of rice, wheat, etc.]

8. Prepare a mixture of grated coconut, date, and sugar by triturating it. Prepare small cakes by stuffing a little portion in the dough. Fry these cakes in ghee. It is called 'savory cake'.

[This is called *sajjappa* in Kannada and Tamil.]

9. Smear a hot frying pan with the roots of amaranth plant (*Amaranthus cruentus*) or the leaves of *kokilaksha* (*Hygrophila auriculata*). Cook buffalo milk in this frying pan. The resultant is a soft cheese [called *haluvuga* in Kannada].

10. Milk balls:

Reduce the buffalo milk to its half by adding to it the powdered roots of Indian abutilon (*Abutilon indicum*) or country-mallow (*Sida cordifolia*). Add the mixture of ghee, sugar, and powders of cinnamon, cinnamon leaves, and cardamom to this milk in its hot and liquid state, and mix them well. Balls can be prepared from this congealed milk. The milk balls will taste like ambrosia.

11. *Idli*:

Grind the washed split blackgram dhal and add clear water obtained from the surface of the curd to it. Add asafetida, cumin seeds, coriander, and black pepper to it. *Idlis* prepared from this ground paste will be highly delicious.

12. *Laddu* (sweetmeat ball):

Add curd to the boiled milk and allow it to turn into curd after some time. Add hot ghee to it and mix it well by stirring. Add the rice flour (hand ground flour of brown rice) and cook the same. Prepare *savige* from this roly-poly on a clean cloth. Prepare balls from this *savige* by using *paka* (syrup) of sugar and milk as adhesives. This is called *laddu*.

[*Savige* is equated as vermicelli, where the porridge (or a thick gruel) is pressed through a perforated machine. *Paka* – sugar solution is heated to get thick syrup.]

13. Add the juice of jujube fruits or of tamarind roots to the roly-poly (of rice flour preferably, which is cooked with ghee already as in verse 12). Prepare balls from this *savige* using *paka* of sugar as adhesive. This is also *laddu*.

14. Prepare cakes from the roly-poly (as in verses 12 or 13). Pound the cakes and make into a fine powder. Add 20% (by weight?) of dates or jujube fruit pulp, or grapes to this powder and prepare a perfect dough by mixing it in *paka*. Add the powders of saffron, cinnamon, cinnamon leaves, and edible camphor to this dough. The balls made out of this dough are called the *khanda ladduge*.

15. Add hot ghee to the dough (of rice or wheat) and mix them well by pounding it in a stone mortar. [This is a skilled job.] Make lumps or cakes from this dough in the shape of flesh and dry them. Soak these lumps in the cold infusion of chickpea (flour?) and prepare any dish as one likes. This dish will give strength to the body similar to that of meat.

16. When the cakes in the shape of fish made out of the dough of the powder of parched chickpea or the ground paste of blackgram are fried in hot mustard oil, the cakes possess the nutrients of cooked fish.

17. Soak the leaves of coffee senna in rice pap for three days. Take out its clear water and grind barley, sesame, and blackgram in it. Add the powders of asafetida and turmeric to this porridge. Make *sandige* from this porridge.

[*Sandige* is a particular condiment made out of grains or pulse flour. It is dried in sun and then fried in oil or ghee for use. It is a household dish of the people of old Mysore state, Tamil Nadu, and other parts of India. It is normally prepared in summer for daily use in the following rainy season].

18. Whet the small cut pieces of leaves of *kamboji* (*Breynia retusa*) in salt and lime juice. Whet the shoe-flowers in buttermilk. Grind both these liquids. Mix them together. This will have the light color of coral and savory.

19. Mix the cut pieces of the roots of *matsyakshi* (*Alternanthera sessilis*) and lime with small, cut pieces of the tender core of the pseudostem of an edible banana plant and lime; cook this mixture properly. Add the required spices to it. The resultant will be soft and tasty *palya* (cooked vegetable – banana psuedostem).

20. Soak the pipal shoots in buttermilk and mix well. Add the tender bael fruits and salt to it. Add water, milk, emblic myrobalan, mango, and salt to it and mix them well. The final product retains its odor and is savory and soft.

21. Cook *karavella* (*Momordica charantia*) leaves, tamarind shoots, castor shoots, and *palasha* (*Butea monosperma*) flowers separately in lime water. Wash these leaves and flowers in clean water. Any particular dish can be prepared from the leaves or flowers.

22. Wash the leaves or sprouts of field bean in the decoction of turmeric powder. Cook these washed leaves or sprouts and the roots of vegetable amaranth. Grind this cooked vegetable in a stone mortar and add required spices to the paste. The final preparation will have the taste of coffee senna leaves.

23. Detoxification:

Cook the seeds of Indian beech and black plum along with the roots of *meshashringi* (*Gymnema sylvestre*) [also called *kadasige* in Kannada] in lime water. The cooked seeds lose their toxic properties after being washed in clean water. The *thovve* (similar to chutney) made from these detoxified seeds will be savory.

24. Methods of debittering:

Add cooked ironwood shoots and seeds to the bitter gourd roots soaked in fresh lime water. Wash the shoots in water later. The cooked shoots of ironwood can be used to prepare any soup, *sambar*, etc. The treated seeds of ironwood can be used to prepare *sandige* by powdering it, which will be very delicious.

25. The bitterness of neem leaves is removed when cooked with the roots of *bakulah* (Spanish-cherry), jequirity, drumstick tree, or sacred basil.

26. The shoots of *nirgundi* (*Vitex negundo*) should be boiled with turmeric powder, roots of tree cotton, and fresh lime and then washed in water. Any *sambar* prepared from this debittered sprout will be very delicious.

27. The contra herbs or herbal products to remove bitterness are as follows:

For *khadiravallari* (*Acacia pennata*) leaves, it is the fiber of Indian cherry; for *gulancha* leaves and whole plant, it is the leaves of siris; for the roots of milk-bush, it is the leaves of field bean; for *laghulonika* (*Portulaca quadrifida*) leaves, it is the salt; for garlic and onion, it is the leaves of field bean; for the immature fruits of *shatavari* (*Asparagus racemosus*), it is the jujube leaves; for elephant-foot yam rhizomes, it is the betel leaves; for aloe (*Aloe barbadensis*) juice, it is the burned ash of milk-bush; for madar, it is the sesame; for tender jujube fruits, it is the rice pap; for salt, it is the sacred basil leaves. When these contra herbs are cooked together, they lose their bitterness.

28. When elephant-foot yam rhizome, cut into small pieces, is soaked in rice pap for some time and boiled with tamarind shoots, it loses its itchy trait.

[Normally this vegetable is cooked with tamarind water or buttermilk to remove its itchiness.]

29. Cook the Indian lotus rhizomes in water soaked with the burned ash of the plant, *Aristolochia bracteolata*. Remove the cooked lotus rhizomes, and wash them in water. Cook them in ghee later. The lotus rhizomes lose their bitterness.

30. Raw fruits of ivy gourd lose their bitterness after being cooked with lime water. The fruits of bitter pointed gourd lose their bitterness when their crushed pieces are boiled along with the leaves of *kokilaksha* (*Hygrophila auriculata*), castor, and *Capparis zeylanica* in water.

31. Soak the crushed thorn apple (*Datura stramonium*) in lime water for one day. Wash it on the next day in water. Boil this washed crushed thorn apple along with the leaves of jequirity,

Indian oleander (white), and Indian lotus plant with lime water. Roast this thorn apple with ghee. Any recipe made out of this thorn apple will be very delicious.

32. Pellets of mango and other immature fruits can be preserved in ghee. Ripened mango fruits can be preserved for many days, retaining its color and taste when preserved in liquid jaggery (from cane sugar) or honey.

33. Cut pieces of immature mango smeared with the mixture of jaggery (from cane sugar) and pepper exude the juice when kept in sunlight. Similarly, the mango fruits exude their juice when the pulp is smeared with rock salt and kept in sunlight.

34. Cut the citron fruit into two halves and smear the pulp with a mixture of borax and the charcoal powder obtained by burning the fan palm. Citron fruit exudes its sap, when this is kept in sunlight.

35. Keep mixture of the edible part of the jack fruit, shoots of *nayinerale*, camphor, and gingelly oil in sunlight. The jack fruit converts itself into a juice.

36. Smear the ground paste of the tamarind flowers, *chitraka* (*Plumbago zeylanica*) root, black pepper, tender banana, and tender leaves of Bermuda grass or rose apple leaves to the pulp of banana fruit. The banana fruit gets converted into a juice after being exposed to sunlight.

37. Rose apple fruits smeared with sugarcane juice and kept in sunlight exude their juice.

38. Samarang rose apple exudes its juice when kept in sunlight after being smeared with the mixture of powders of borax, camphor, thorn apple (*Datura stramonium*) seeds, and common jasmine leaves.

39. Adding 20% of jaggery (from cane sugar) to the ground paste of the rhizomes of Indian blue waterlily gives sugar.

40. Add hot spoiled (rancid) ghee to boiling milk, and add curd to curdle this milk. Extract butter from this curd and convert it into ghee. This ghee is now purified (no odor). Alternatively, add the leaves of Indian dill to this spoiled ghee and heat the same. The ghee gets purified (deodorized) and will have smell of musk.

41. Mix oil, curd, buttermilk, and fresh ghee in equal proportion and add coriander seed powder to it. Heat this mixture. This gives good quality ghee.

[Is it an organic ghee or herbal ghee?]

42. Heat the mixture of wood-apple pulp and gingelly oil. Add equal proportion of ghee to the heated mixture. This is good quality ghee.

43. Good quality butter:

Milk should be reduced to its half and the powder of *apamarga* (*Achyranthes aspera*) or the root of *mahabala* (*Sida rhombifolia*) is added. This milk should be allowed to curdle; butter extracted from this curd is of very good quality.

44. Add flowers of *karnikara* (*Pterospermum acerifolium*) or pure gingelly oil to milk and heat the same. Curdle this milk and extract butter from this curd. This butter will give an increased quantity of ghee after being heated.

45. Add mixture of the powders of chickpea and ginger to milk and boil the milk in an urn. Keep the pot in cold water. The milk gets solidified.

46. Soak grated coconut in the infusion of long pepper and grind the whole mixture later. The squeezed liquid will have the taste similar to that of milk.

47. Soak the pulp of wood-apple in milk for twenty-one days. Dry the pulp in shade. Add sugarcane juice to this pulp. This juice will have the taste of milk.

48. Mango and champac curd:

Smear the inside wall of a clean pot with mango juice. Add hot milk to this urn. The milk gets converted into curd, which will have the fragrance of mango. Similarly smear the inner wall of a pot with the ground paste of the roots of *chitraka* (*Plumbago zeylanica*) and add boiled milk to it. The milk gets converted into curd, which will have the fragrance of a champac flower.

49. Storing boiled milk in an urn, the inner walls of which are smeared with the juice of fresh green emblic myrobalan or the pulp of wood-apple results in the formation of a thick curd.

50. Fill the hollow of a bamboo culm with boiled milk and seal it tightly. Bury this sealed culm in putrid mire for three days. The curd formed in this culm will be thick having the shape of the culm itself.

51. Preparation of fresh curd:

The pulp of the wood-apple should be squeezed by hand in a thick curd twenty-one times. This pulp should be strained and dried in shade (or sun). This dried pulp or its powder can be stored in a new urn for daily use as curd powder. This is used along with water daily and has the taste of curd.

52. Add Indian lotus powder (or saffron) to the boiled milk and allow it to get curdled. The juice squeezed from this curd will have the taste of mango and will also be savory.

53. Add mixture of the powders of black pepper, cumin, sugar, and dry ginger to citron juice. Add this mixture to curd proportionately and strain the same. Add powdered asafetida, ironwood flowers (or buds), clove, and cinnamon to this juice. Fumigate this juice with jaggery (from cane sugar). This juice is delicious like buttermilk.

54. *Sikharini*:

Add the mixture of the powders of cinnamon, dry ginger, black pepper, rock salt, jaggery (from cane sugar), nutmeg, zedoary, and ironwood flowers to curd proportionately. Fumigate this curd with chebulic myrobalan, lac, honey, and sugarcane juice. Add edible camphor to it later. This is called *sikharini*.

55. Grind cardamom, cumin, mustard, black pepper, cinnamon, and coriander seed in water. Add this paste to gruel of any pulse and stir it well. Cook the gruel and add other fried spices to it (*oggarane*). The soup of this gruel will be very delicious.

[This is a very common recipe prepared in most homes of old Mysore and Tamil Nadu even today, especially in the houses of Brahmins. Sometimes vegetables are also added. The gruel is prepared from pigeonpea or chickpea. In Kannada, it is called *huli* (*kolambu* in Tamil) when prepared from pigeonpea and is called *kutu* (also in Tamil) when prepared from chickpea. Many other variant recipes are also provided. This recipe is almost mandatory in most of the community lunches/feasts.

Oggarane – There is no English word for this. This is a kind of seasoning; one or more spices are thrown into boiling oil or ghee, and then vegetables are added and boiled with the mixture or added to pulse that has been boiled with salt, tamarind, pepper, etc. (Source: Rev. F. Kittel, Kannada-English Dictionary).]

56. Boil juices of jujube, emblic myrobalan, pomegranate, tamarind, and citron fruits separately. Add sugar or jaggery (from cane sugar) to them and strain the juices in separate white clothes.

57. Fumigate these juices with white agar, nut grass rhizomes, and camphor separately. Add powder of black pepper, ironwood flowers, cinnamon, nutmeg, and cardamom powders. This is a good beverage and tastes like ‘ambrosia’.

End of Chapter VIII.

Chapter IX – Treatment of animals

There are 58 verses that cover ayurvedic treatments of animals.

Treatment of cattle

Problems during calving

1. Pour the ghee from goat or sheep milk into the vulva of a barren cow. Also, pour the crushed juice of vetiver roots on the vulva. This helps in “embryo formation” in a barren cow.
2. Feeding powdered mixture of seeds of *bakuchi* (*Psoralea corylifolia*), sesame, field bean, and agati sesbania (*Sesbania grandiflora*) to the cow or a buffalo helps the dead calf entangled in the uterus to come out.
3. If the chorion of a just delivered cow does not come out, the cow should be administered with the powdered mixture of agati sesbania, greengram, field bean, *bakuchi* seeds, *kantakari* berries (*Solanum surattense*), sesame oil cake, and whole plant of bottle gourd (along with the roots) ground in milk or liquor. This helps in the release of the chorion.

4. Tying the seed of jequirity or Bermuda grass that has grown below the red silk cotton tree to the neck of a buffalo, horse, goat, and other animals helps in the release of chorion quickly.
5. If the just delivered cow eats its own chorion, it should be fed *susalu* with jaggery (from cane sugar). Alternatively, agati sesbania ground in milk should be administered to the cow. This removes the disorder of the cow.

[*Susalu* or *susal* is a particular recipe prepared out of sesame powder boiled in steam after folding it in plantain or any other leaf. It is eaten later adding rice flour and jaggery (from cane sugar). The preparation varies in different areas.]

6. If the calf appears to come out of the uterus of the cow well before the completion of the pregnancy period, it should be washed with sour gruel and later smeared with the juice of black nightshade fruits or of prickly chaff flower plant root and should be pushed in with the fist. This will enable the calf to return to its proper place in the uterus of the cow.
7. When a cow does not allow its calf to come close, the calf should be anointed with nut grass rhizomes, salt, and cumin ground in buttermilk and placed in front of the cow. The cow will allow its calf by licking it with motherly love.
8. To make a fierce cow amenable, grind the arecanut wood in goat urine and smear the eyes of the cow with it. Alternatively, grind black mustard, sweet flag, and *kodhab* seeds (*Cadaba fruticosa*) in goat urine in a stone mortar and smear its eyes with it. The cow will become mild.
9. Grind the roots of bastard teak, *garbhada* (*Solanum stramonifolium*), *kantakari* (*Solanum surattense*), and akund or *mandara* (*Calotropis procera*) with salt in buttermilk in a stone mortar. Anointing the body with this paste, a savage cow would give milk.

Diseases of the mouth

10. Wash cow's mouth with hot water. Grind the leaves of madar (*Calotropis gigantea*) in mustard oil and add sesame oil to it. Smearing the cow's mouth with this preparation cures mouth diseases.
11. The symptoms of mouth disease are rapid breathing, reddish mouth, and slavering. For treatment, wipe the cow's mouth with a crow's plume and wash it in hot water. Smear ground paste of ginger, long pepper, and black pepper to the cow's mouth.

Cough

12. Snuff the ground paste of wild indigo leaves in gruel, or the ground paste of agati sesbania leaves in cow's buttermilk, or rice wash mixed with salt. This treatment relieves the cough of the cow.

Albugo

13. Burn the juice of madar plant filled in a small wooden or bamboo shell. Prepare an ointment of this ash with butter as base and smear the same in the eyes. Alternatively, anoint ground paste of the jequirity roots to the eyes. This cures albugo.

[Albugo is an affliction of the eye resulting into a white opacity in the cornea.]

Swellings

14. Grind the whole plant of *bhumyamalaki* (*Phyllanthus fraternus*), salt, marrow juice (*nenaavuli*?), roots of *patalagaruda* (*Cocculus hirsutus*), ivy gourd, and the soil at the death place of an otter in liquor. Application of this paste to the swellings cures the same.

Swollen belly

15. If the cow's belly is swollen, administer the following orally:

Grind whole plant of amaranth (for vegetable), rock salt, immature bael fruit, *nirgundi* (*Vitex negundo*) leaves, buds of banyan tree, roots of *dhattura* (*Datura metel*), Indian lotus rhizomes, and whole plant of Indian spinach with water in a stone mortar. This treatment relieves the swellings of the belly.

Stomach pain

16. Non-grazing, fatigue, hissing, and continuous thrashing of legs are the symptoms of stomach pain in cow. Grind ginger, garlic, *gajapippali* (*Scindapsus officinalis*), creeper of black pepper, asafetida, zedoary, jaggery (from cane sugar), salt, turmeric, sweet flag, and ammi in water and administer the same to the cow. This treatment relieves stomach pain of the cow.

Fever

17. Drooping of ears, hiccup, trembling, coughing, and high temperature are the symptoms of fever. Administer crushed juice of *vanamallika* (*Jasminum rotterianum*) plant. Alternatively, administer decoction of *nirgundi* (*Vitex negundo*) and neem leaves. The well stirred hot decoction of horsegram, roots of *varahikanda* (*Tacca integrifolia*) can also be administered. This cures the fever of the cow.

18. Smearing a cow with the ashes from a burial ground of the low-caste people, or the burned ash of a chain viper (*Daboia russellii*) to the cow's body also cures its fever.

Nervous disorders

19. Sighing, hissing, drooping of ears, and unconsciousness are the symptoms of nervous disorders. The treatment is to administer ground paste of rock salt, mustard, rice grits, black pepper, salt peter, natron (hydrous native sodium carbonate), and ginger along with rice gruel to the cow.

20. Swollen stomach, lime smell from the mouth, and folded tongue are the symptoms of nervous disorders. The treatment is to pull out the folded tongue and smear the mixture of tamarind and salt on the fold of the tongue.
21. Suspended ears, stiffness of the body, squinty eye, and drooping eyes are to be treated by applying the burned ash of the silk thread into the eyes. Alternatively, the juice of neem fruits has to be applied into the ears of the cow. Otherwise the cow is to be cauterized in the portion from the ear to the heel.

Twisting disease

22. If the cow falls to the left upon twisting, the right nostril nerve is to be loosened. If the cow falls to the right upon twisting, the left nostril nerve is to be loosened. This cures the twisting disease.

Non-rumination – *kogile* disease

23. By smearing eyes of the cow with the ground paste of ginger, black pepper, and long pepper, the cud gets out and relief is obtained. Similarly, smearing eyes of the cow with an ointment made from pounded flour of cotton seeds mixed with ghee alleviates the *kogile* disease.

Waning diseases

24. Leaning of cows, supineness of eyes, trickling of rheum from eyes, and stiffness of body are the symptoms of waning diseases. The treatment is as follows:

Grind the roots of *patalagaruda* (*Cocculus hirsutus*), *girikarnika* (*Clitoria ternatea*), and Indian caper with rice water and administer it to the cow. Alternatively, bottle gourd should be tied to the animal neck.

Boils of gum and hoof

25. Crush turmeric, *surasa* (*Trichodesma indicum*), thorn apple (*Datura stramonium*), roots, madar roots, and the roots of the greater galangal and cook them in butter from cow milk. The treatment is to smear the affected gum with this ointment. Cut the boil in the hoof and apply a mixture of the leaves of screw-pine and rock salt ground with buttermilk. Fomentation of treated boil is done. This cures the boils of the hoof.

Boils on the nerves, veins, etc.

26. Cook the roots of *kuratige* (*Lannea coromandelica*), Indian almond tree, bonduc tree, madar juice (or milk), black pepper, zedoary, ginger, and bitter apple in sesame oil and apply the same on the boils. Alternatively, apply cooked juice of tamarind leaves on the boils. This cures such boils and relieves bullocks from associated pains.

Worms in the horns

27. If worms attack the cattle horns, the dog's skull should be tied to the cattle's neck. Alternatively, the roots of *utakanta* have to be ground with pap (rice?) and the paste is applied on both the horns throughout. This destroys the worms and cures injury, if any.

Swelling of shoulders

28. Mix burned ash of madar, juice of *bhringaraj* (*Eclipta prostrata*), and salt and put it on the shoulder (i.e., a bag of this mixture). Alternatively, crush the sensitive-plant, turmeric, buds of silk cotton tree, Indian bdelium, chebulic myrobalan, garden rue, prickly chaff flower plant, and arecanut and cook them in sesame oil. By applying this ointment on the shoulder, swellings are cured.

Weakness

29. Non-grazing, non-drinking of water, non-rumination, and sleepiness are the symptoms of cattle's weakness. The administration of a decoction of crushed neem leaves (or the bark) and ginger cures the weakness.

All types of diseases

30. Grind the leaves of *dronapushpi* (*Leucas aspera*), *nirgundi* (*Vitex negundo*), bottle gourd, madar, mustard, betel pepper (*Piper betle*), and lime and stir this paste in a gruel along with sesame oil. Oral administration of this medicine cures ninety-six types of cattle diseases.

[Usually in cattle treatment, a bamboo tube, called *gotta* or *kotta* in Kannada, is used for oral administration of medicines. Wherever such a reference is made, bamboo tube is to be used to administer the medicine orally to the cattle.]

Treatment of horses

31. The disorders of horses are also due to the disorders of the *tridoshas* (humors), viz., *vata*, *pitta*, and *kapha*. Their balance is said to determine the state of health. The disorders of *vata* in horses increase their digestive fire; *pitta*, increase body temperature; and *kapha*, decrease digestion. When all these *tridoshas* are in a balanced state, the horses are said to be healthy.

Digestion

32. Administering the following medicinal preparations orally can cure all breeds of horses. Grind the following ingredients in a stone mortar with buttermilk to make a paste:

Roots of Indian almond tree, *vasaka* leaves, *katuka* (*Picrorhiza kurroa*) roots, bitter apple, *nirgundi* (*Vitex negundo*) leaves, whole plant of Asiatic pennywort, neem leaves, asafetida, *vidanga* (*Embelia ribes*), madar leaves, *girikarnika* (*Clitoria ternatea*) roots, zedoary, roots of *chitraka* (*Plumbago zeylanica*), and roots of bitter pointed gourd.

Oral administration of this paste cures all diseases of horses.

33. If body temperature of the horses increases on account of increase of *pitta*, liquid diet should be administered in the morning; salt and other medicines in the afternoon; and the decoction of horsegram and its preparation in the evening.

34. Grind lac, *rasanjana* [a preparation where the decoction of the roots (or the powdered roots) of Indian barberry is mixed with milk and made into a collyrium by dehydration], turmeric, long pepper, rock salt, roots of greater galangal, licorice, and ginger in a stone mortar and mix it in goat's milk. Placing this paste (or small tablets) in the nostrils of the horse cures the *pitta* and related disorders. Mixing the above ground paste in cow's urine and placing this mixture in the nostrils of the horse cures *kapha* disorders. Mixing the same in hot water and applying this mixture in the nostrils of the horse cures the *vata* disorders.

Snot

35. If a horse is found to snivel with water, or turmeric yellow, or white phlegm, this is called the snot disease.

36. Pulverize deodar roots, rock salt, nut grass rhizomes, fossil salt, *vidanga* (*Embelia ribes*), and natron, and mix them well by stirring in sesame oil and cow urine. Applying the paste in the nostrils of the horse cures the snot disease.

Phlegm

37. Take the leaves of siris, wheat, snake gourd, *vasaka*, dita bark tree, bael, *gambhari* (*Gmelina arborea*), yellow snake tree, and castor. Cut these leaves and warm them in a pack. Apply this warm pack repeatedly on the face of the horse. This cures the phlegm.

Cough

38. Cut the roots of *kantakari* (*Solanum sarmentosum*) and Indian nightshade, the leaves of neem, *nirgundi* (*Vitex negundo*), and *vasaka* into small pieces, dry these, and grind to get a fine powder. Add this powdered mixture to cow urine and cook the same. Add powders of dry ginger and *bharangi* (*Clerodendrum indicum*) root to this decoction. Oral administration of this decoction to the horse cures cough.

Acute pain

39. Fainting, swelling of the face, panting, sweating, swelling of the belly, and dysentery are the symptoms of acute pain. The treatment is to place the mixture of the powders of long pepper and rock salt in the nostrils, ears, and the anus, and also in the testicle veins.

40. Alternatively, mixture of the powders of salt, long pepper, sweet flag, mustard, immature fruits of *mullakarae* (*Meyna laxiflora*), and dry ginger mixed in (cow) buttermilk, gruel, and sesame oil is to be placed in the nostrils of the horse.

41. Oral administration of the fine powders of rock salt, fossil salt, black salt, *sochal* salt, common salt (five salts – *panchalavana*), asafetida, long pepper, dry ginger, immature fruits

of Indian persimmon, coriander, chebulic myrobalan, camel thorn, *atis* root, *chitraka* (*Plumbago zeylanica*) roots, and ammi in equal proportion mixed in liquor cures acute pains.

Dropsy or pain

42. If dropsy occurs with acute pain during the pregnancy of a horse, a mixture of the juice of *brahmi* (*Centella asiatica*) and sesame oil is to be orally administered to the horse. This cures the pains.

Worm infestation

43. A mixture of the ground paste of roots of field bean and ghee should be administered to the horse orally. The ground paste of the leaves of Indian coral tree and gingelly oil or ghee can also be administered. This cures the worm infestations.

Diarrhea

44. Add the powders of *atis* root and ginger to the suspension of the ground pastes of *kutaja* (*Holarrhena antidysenterica*) and licorice in curd water (the pellucid water on the surface above the curd, wherein hot milk has coagulated in an earthen vessel). Oral administration of this final formulation cures diarrhea.

Retention of urine and bloody urine

45. Administer the juice of jujube fruits by scraping the pulp. Alternatively, administer the juice of bael roots obtained by grinding the same with water on a stone slab. This relieves the retention of urine in horses. Add the juice of *vasaka* leaves (the leaves are warmed on a live coal to extract their juice) to cow's milk and sugar, and administer the same to the horse. This stops the passing of bloody urine.

Symptoms of fever and treatment

46. Erect downs, physical torpidity, foul smell from the mouth, non-grazing, excessive thirst, sleepiness, and panting are the symptoms of fever in horses.

47. The treatment for fever is as follows:

Prepare a decoction of the powders of nut grass roots, long pepper, deodar, catechu (*Acacia catechu*), neem leaves, *chitraka* (*Plumbago zeylanica*) roots, bark of the dita bark tree, bark of black plum tree, *ashvagandha* (*Withania somnifera*) roots, king of bitters (whole plant), *danti* seeds (*Croton tiglium*), *katuka* (*Picrorhiza kurroa*) roots, and *gulancha* (*Tinospora cordifolia*) whole plant in an urn and reduce the decoction to one-third of its volume. Add honey to this decoction and administer it to the horse. Alternatively, if other ingredients are not available, mix the hand-ground paste of neem leaves, long pepper, and *katuka* roots in water along with honey and administer it to the horse. This cures all types of fever of the horses.

48. Cook greengram and boiled rice in the decoction of neem leaves. Add the juice of the root of bitter pointed gourd, honey, and powder of long pepper to this cooked rice. Mix them well and prepare rice balls. Feeding of these balls cures the fever.

Various diseases

49. During the diseases of rheumatism and fatigue, horses should not be allowed to drink water in the winter but administered with the mixture of chebulic myrobalan powder and rock salt. The preparation of the mixture and dosage is as follows:

Take the powder of two hundred chebulic myrobalan fruits and add rock salt to it. Divide this mixture into eight equal parts and administer one part for every *yama*, for a period of two days (see Chapter IV, verse 17 for *yama*; this dosage can be mixed with food). In summer, the mixture is to be administered with jaggery (from cane sugar) using the same dosage. This treatment cures various types of diseases of horses. The *kapha* and *vata* will be in equilibrium.

50. Prepare a decoction of the well crushed powders of the roots of the greater galangal, *vasaka* leaves, Indian dill, bark of bael tree, fruits of wild Himalayan cherry, ginger, nut grass rhizomes, roots of *nikumba* (*Jatropha glandulifera*), roots of camel thorn, *vidanga* (*Embelia ribes*), *agnimantha* (*Clerodendron phlomidis*) roots, castor roots, roots of *gokhru* (*Tribulus terrestris*), roots of *kantakari* (*Solanum surattense*), and the roots of poison berry (?). Administration of this decoction cures all types of diseases of horses.

51. Licking of mud, downcast face, hiccups, drowsiness, swellings, and intoxication in horses have to be treated as above (see verse 50).

Swellings

52. Grind the following ingredients in a stone mortar and make a paste:

Indian rosebay roots, whole plant of *kokilaksha* (*Hygrophila auriculata*), roots of drumstick tree, roots of sacred basil, roots of *nikumba* (*Jatropha glandulifera*), elephant-foot yam rhizomes, ginger, jasmine (*Jasminum officinale*), five salts, viz., rock salt, fossil salt, black salt, *sochal* salt, and common salt, madar leaves, black mustard, turmeric, and stems of Indian barberry.

Add anthill mud to this paste and mix them well in water. Heat this mixture. Application of the warm gruel paste on the swellings cures all types of swellings. Alternatively, application of the mixture of natron and ghee also cures the swellings.

Itching

53. Apply the mixture of the burned ash of milk-bush and ghee to the itch. Otherwise apply the mixture of the burned ash of white damar (*Vateria indica*) leaves and oil. This also cures the itches of the horses.

54. Grind the powders of salt, minium (red oxide of lead), turmeric, and natron. Add any one of the powders of rock salt, Barbados aloe plant, or wild indigo (*Indigofera uniflora*) roots to this gruel and apply this ointment on the itch. This cures the itches.

Abscess

55. Add the powders of yellow orpiment (arsenic trisulfide), fresh lime, *karnikara* (*Pterospermum acerifolium*) seeds, sulfur, Indian barberry, minium, five salts (mentioned earlier), ginger, long pepper, black pepper, turmeric, and natron to the mixture of goat milk and sesame oil, and mix them well. Application of this ointment cures various types of abscess.

Abscess of the hoof

56. Mix the powders of yellow orpiment, jaggery (from cane sugar), Bengal damar (*Shorea robusta*?), raw lead, lac, and black pepper in sesame oil and prepare an ointment. Application of this ointment cures abscess of the hoof.

Treatment of elephants

57. Black pepper, Java long pepper, *vidanga* seeds, *katuka* (*Picrorhiza kurroa*) roots, *chitraka* (*Plumbago zeylanica*) roots, roots of drumstick tree, lamp black (from ghee), greater galangal roots, costus roots, sweet flag, Indian beech tree roots, long pepper roots, five salts, two *ajwains* (ammi and ajmud), celery, dita bark tree roots, neem leaves, asafetida, *atis* root, bitter snake gourd roots, black mustard, cumin, ginger, belleric myrobalan nuts, myrobalan emblic nuts, bark of black plum tree, chebulic myrobalan nuts, bonduc nut, and niter –

58. – are to be taken in equal proportion, powdered and mixed well in gruel and fed to elephants. This treatment cures diseases of acute pains, disorders of the spleen, worm infestations, sluggishness, cough, weakened digestive power, lack of appetite, etc.

End of Chapter IX.

Chapter X – Treatment of snakebite poison

Causes of snakebite

1. Crossing snakes during the release of their slough, formation of circular figures on their back, snakes being hostile after being hit by a stick, being infatuated after food, more accumulation of venom, when snakes are erect, trouble caused by people during the cohabitation of male and female snakes, and the doubt of snake in the mind are the causes of snakebite.
2. Snakes do not bite on burial grounds, anthills, below a tree, gardens, and squares due to the threat of Garuda (eagle).

3. While snakebites on the head, neck, face, locks, bottom of the palm of the hand, center of the forehead, eyes, cheek, sole of the foot, tip of the nose, navel, beard, chest, forehead, back head, penis, tip of the left breast, back, and eyebrows, are not even tolerable by Garuda, how can others endure the same?

Attributes of the messenger

4. The symptoms of curability or otherwise of a snakebite can be ascertained by the attributes of the messenger. A messenger carrying the news of the snakebite who is trembling, frightened, aggrieved, lamenting, tiring, having oil anointed on his body, wearing a red colored cloth, wearing red colored flowers on the braid, holding a stick, holding leather, and holding a rope are indications of the incurability of the snakebite. A messenger who is wearing a white cloth, laughing, a person of non-abusive character, sweet speaking, patient, and a person of good character are the indications of curability of snakebite.

5. If the messenger looks at the sky after delivering the news of snakebite it is an indication of incurability of the snakebite. If he touches any part of his body, it indicates the part of the body bitten by the snake. Regarding the indications of the caste of the patient, if the messenger touches his head, it is a Brahmin, the shoulders a Kshatriya, the thigh a Vysya, and the foot a Sudra.

Characteristics of breath

6. At the time of the message, if the *vaidya* (doctor/native doctor) has his breath passing through the right nostril on Sundays, Tuesdays, and Saturdays, it is very much favorable. The message at the time of going for copulation and meals are also auspicious. If the breath passing through the left nostril either squeezes at the top or bottom or the middle, it is favorable. All contraindications are inauspicious.

7. If the messenger stands in the front, or to the left, his prayer succeeds. If the breath is passing through the left nostril at that time, it indicates that the patient is a woman; and right nostril, a man. If it is through both the nostrils, it is an indication of inauspicious results.

8. The symptoms of the patient to be rejected for treatment are absence of saliva on the tongue, extirpitation of the hairs from the head, blackened color of the nails and teeth, cold expiration, swollen belly, sunken eyes, dry throat, bending of neck to one side, and nasal tone.

9. If the patient opens his eyes after being sprinkled with the holy water consecrated with the principal syllable of Vayu mantra, viz., '*Om hrim vah*', it is an indication of the survival of the patient.

10. It is a good sign when the patient moves about his limbs or other parts of the body due to pain and sighs deeply. Such a patient should be sprinkled with the holy water consecrated with the principal syllable of Garduda, Vayu, and Gagana (sky), viz., '*Om (vyam) ham sah*'; (*om*) '*plavasah*' (*om*) '*playavasah*'.

11. Then the cold holy water consecrated with the principal syllables of the above Hamsa (Garuda), Vayu, and Gagana mantras is to be administered to the patient. If the patient vomits this holy water, it is an indication of the non-survival of the patient.

Preliminary methods

12. First remove the cerumen (earwax) and smear it on the eyes of the patient. Cut the site of the snakebite, and massage well to remove any venomous substances. Remove the blood at the site after tying a tourniquet above and below the site of the bite. The site of the bite should be burned, and blood vessels rubbed softly so that the venom does not vitiate the body. These preliminary methods, if undertaken immediately, mitigate the effects of the venom.

13. The site of the bite of a large hooded boa or a chain viper should be burned with hot rods of gold, iron, etc., or even by live charcoal. Fire burns the venom into ash and the venom does not spread into the body.

[The text is incomplete. The commentary is not available in the printed edition. The translator as per the usual sequence and his experience introduced this verse.]

14. If the patient breathes through the nose and mouth swiftly, and mutually pulling and seizing, the chanting of the principal syllable of Hamsa mantra, viz., '*Om ham sah*' in the ears of the patient fades away the effects of the venom.

Drugs

15. Administration of an excellent medicine prepared from curd, butter, black pepper, long pepper, ginger, and salt detoxifies the patient from the bites of many types of snakes.

16. Administration of a medicine prepared from mixture of juices of the roots of bitter apple, *patalagaruda* (*Cocculus hirsutus*), bracteated birthwort, and *aparajita* (*Clitoria ternatea*) added to the juice of the pulp of the bitter gourd, detoxifies the patient.

17. A mixture of the roots of *gokarni* and indigo, puneala plum fruits, seeds of ribbed gourd and leaves of *bhringaraj* (*Eclipta prostrata*), taken together, gives immunity from snakebite equivalent to that of Garuda (a mythological bird that is enemy of serpents). Snakes are said not to come near such persons.

[One of the practices is to take this medicine once every year on the Naga Panchami day (fifth day of *Sravana* month, i.e., July–August after worshiping Naga, the snake god. The medicine is usually added to milk or food and taken along with it. Communities practice this in some parts of India.]

Mantras to drive away the snakes

18. Write the sketch of snakes and the Garuda mantra '*Om kurukulle svaha*' with marking nut oil in a hexagonal amulet by spelling the same mantra. This amulet drives away the entire snake community.

Preventive methods against snakebite throughout the year

19. A person who consumes the drink prepared from the ground paste of roots of black siris on a Gurupusya day [Gurupusya is a combination of a Thursday and *Pusya* constellation, supposed to be very auspicious] will not have threat from snakebites. Alternatively, ground paste of the flowers of black siris on a Gurupusya day will not have threat from snakebites. Also, the paste of the flowers of siris ground in rice water can be taken to get the same benefit.
20. Tying the idol of Garuda made out of the teeth of a boar on a day of *Pusya* constellation to one's hand also gives him immunity from snakebites like Garuda.

Chain viper

21. To detoxify the venomous effect of the bites of vipers, the medicated ghee should be prepared as follows:

Plant of cock's comb, flowers and seeds of Indian beech, ghee, honey, leaves of *arangaka* (*Melia composita*), and black mustard should be ground. Alternatively, sweet flag, root of barren bitter gourd are to be ground and added to the ghee. Any one of the two medicated ghee preparations can be administered to the patient to detoxify him from the effects of venom of chain vipers.

Cobra or boa

22. Administer the paste of zedoary rhizomes ground in cow dung (from a brown cow) extract. This should be applied to the site also. Otherwise, cow's ghee and gingelly oil should be mixed in equal proportion and administered to the patient. This treatment detoxifies the patient from the venomous effects of cobra bites.

Miscellaneous serpents

23. Grind black pepper, long pepper, roots of yellow snake tree, roots of Indian oleander, roots and flowers of madar in gruel and administer it to the patient. This detoxifies the patient.

End of Chapter X.

Chapter XI – Characteristics of animals

Elephants

1. An elephant with a long trunk, body bigger in size than the trunk, firm back, a strong and plump body, extended hairy lower lip, elevated cheeks, long and broad *kumbhasthala*, and reddish eyebrows is said to possess the characteristics of auspiciousness.

[*Kumbhasthala* is the depressed area on an elephant's head between the frontal lobes.]

2. An elephant with long toes, broad and reddish ears, sounds emanating from the tip of the trunk, fragrant breath, clearly visible wrinkles on the body, smooth, hairless, long and rounded trunk, folding thighs that rub against each other, eyes like those of sparrows, and right tusk longer than the left is fit for worship.
3. An elephant having eyes similar in shape to that of a pigeon or fish, eyelids dark and elegant, long tusks, and honey colored pupil of the eyes is excellent.
4. An elephant having no reddish moles, having round shape, distinct whitish or colored spots on the body, and having a sound similar to a kettledrum bestows complete kingship.
5. An elephant having uniformly erect hair on its head, eyes with an attractive sunken outer corner, an elevated forehead, and a non-contracted neck behind the long face is fit for worship.
6. Elephants with firm and long shoulders, well-elevated head, broad chest, slender belly, attractive dugs, a broad, firm and reddish navel, non-hairy big tip of the testicles, and attractive rump and tail are excellent.
7. An elephant having eyes resembling a semi-blossomed flower, a chest resembling the chest of a pig, round shaped thighs, firm feet, long footsteps, a total of 18 to 20 nails of the four feet, and a total length of five to seven cubits (one cubit = approx. 45.7 cm) measure is fit for the king's use. This elephant bestows long life and prosperity to the king.
8. Elephants having a leech-shaped tip of the trunk, slim or a large waist, two dumb tusks with tips joined, blackish large dugs, top like protruded naval, inserted testicles, lean back, and curved and short nails of the foot are inauspicious.

Horses

9. According to the sciences of horses, the eight characteristics, viz., the various parts of the body, whirling, gait, neighing, color, strength, smell, and luster are very important.
10. A horse which has short ears, testicles, ankle joints, and other joints; long neck, face and knees; compact eye sockets, broad tail, chest, and rump; soft hairs on the body; slender corners of the mouth and tongue; and hairs on the body, arms, and belly will be worshiped by the kings.
11. A horse having blooded ears, good eyesight, snout immersing at the time of drinking water, slender hairy and sharp hoofs, testicles hanging a little, and straight, broad, and attractive front and back is certain to have full life span.
12. The tongs-like pairs of teeth at the center, upper, and lower jaws are called *samdamsha*. The pairs of teeth on both the jaws are *madhyama*. The pairs of teeth at the ends of the jaws are called *paripakva*. Two teeth grow every month, thereby resulting in twelve teeth in six months.

13. The *samdamsa* teeth become white at one year of age. Thus, the twelve teeth become white at the rate of two teeth in two months.
14. The teeth of horses become red at eighteen months. In the next two years, they turn black.
15. The *samdamsa* teeth fall when the horse is about two and a half years old and reappear in the third year. After the completion of the third year, the two *madhyama* teeth fall and again reappear in the fourth year. *Paripakva* teeth fall after the completion of the fourth year and reappear in the fifth year. This cycle of teeth formation and fall has a period of five years. The first cycle denotes the age of the horse as five years.
16. After five years, the formation of a black stain on the teeth of the horse is called *katike* (rust), gold stain is *ponce* (goldish), white stain is called *sukti*, and grit-like color is *kaka*. Similarly, the stains of colors of honey, conch, owl, etc. are called by different names.
17. *Samdamsa*, *madhyama*, and *paripakva* teeth have nine different stains. According to the calculation of three years for every stain, the stains last for a total of twenty-seven years. There will be no stains during first five years.
18. Of the ten whirlings of horses, two are on the head, one on the forehead, one at the tip of the nose, two on the belly, two by the side of the external abdomen, and two by the side of the internal abdomen. This is called *dasa dhruva* (ten constants).
19. The presence of whirlings at the corners of the mouth, on the chest, forehead, near the brows, near the eyes and ears, heels, throat, middle of the two sides of the front legs, and shoulder are auspicious.
20. The presence of *devamani* whirl in the middle of the throat and the *rocamaṇa* whirl at the front of the throat nullifies the defects of evil whirlings on the front half portion of the body of the horse. If the three whirlings in the shape of *eni* (ladder), *halli* (lizard), or any other are enjoined on the forehead, these nullify the defects of the evil whirlings on the head. Similarly, the *meghalike* whirling (present at center portion of the back of the girdle), nullifies the defects of the evil whirlings on the back portion of the horse.
21. The whirlings at the following locations are inauspicious:

Below the chin and nostrils; on the cheeks, root of the tail, lower part of the neck, and withers; middle of the two nostrils; below the ears; on the nerves of both sides below the ears; above the throat and brows; below the navel; on the lower and upper lip, testicles, knees, outer corners of the eyes, knee joints, ears, eyes, abdomen, chest, and navel; middle of the chest; and between the *rocamaṇa* and *devamani* whirlings of the throat, waist, middle of the front legs, and small hoof.

22. The horse with the following characteristics is said to be inauspicious:

Whirlings on the lower and center portion of the neck, appearance of two tongues, defective teeth, whirlings on the posteriors, having single testicle, and appearance of three ears.

23. The easily visible five major defects of horses are finger-shaped hooves, dark black hooves, large-sized dugs in male horses, presence of five legs, and presence of horns.

24. The following characters of horses are auspicious:
Getting scared while walking, jumping, walking firmly to right and left, walking independently, walking with upright face, walking with downcast face, smooth walking, and walking like a lapwing (*Parra goensis*), deer, peacock, swan, or falcon.

25. Horses having a deep voice, like the beatings of a big vessel and a tabor, and a uniform voice are the best. Horses having the voice like the beatings of a drum or a trembling kind are not good.

26. White, red, yellow, and black are the four original colors of horses. They represent the four castes, viz., Brahmin, Kshatriya, Vaishya, and Shudra. All these four horses are good. Mixed color horses, which are pleasant-looking, are also good.

27. A white-faced horse with a thick white to the left side of the forehead, with varied colors in the middle, or with faded white color is inauspicious. A fully white colored face is auspicious. Appearance like a *tilaka* (a mark on the forehead) at the center is auspicious and brings prosperity.

28. Aggressive angry behavior of a horse is considered to be 'inferior character'. An intelligent angry behavior is called 'manifesting character' (wrath). Arrogance is called 'demonic character'. A close-minded excessive eating horse is called 'problem character' (*pito satva*). Having many colors is 'devil character'. A lustful aggressive horse indicates good and bad results. A bright, shining, fragrant, sturdy, lovely, attractive, and clean horse is referred as of 'godly character'.

[This verse is incomplete in both the text and the commentary. This translator provides the completed translation after referring the similar verses in Brhat Samhita; it is given as a reference in page 592 in Sanskrit. English translation is not provided there.]

29. If the sweat of a horse has the smell of a bug, sweet flag, foul substance, garlic, or urine, it is not auspicious. The fragrant smell of champac flowers, Indian lotus flowers, and sandalwood is good and auspicious.

30. A horse having pleasant and varied colors is called '*bhumi amsa bhuta*' (born from the essence of the earth). A horse having the color of a cloud, Indian lotus flower, or water is called '*udakamsa bhuta*' (born from the essence of water). A horse having the color of gold, a coral, or a ruby is called '*agni amsa bhuta*' (born from the essence of fire). A horse with a gentle and charming color is called '*vayu amsa bhuta*' (born from the essence of wind). A horse with any unpleasant and rough colors is called '*akasamsa bhuta*' (born from the essence of the atmosphere).

31. Of the above five colors, the atmosphere and wind colors are inauspicious. Other colors, viz., fire, water, and earth are auspicious, and they bestow distinguished results.

Cows

32. The requisite of an excellent cow in this terrestrial world is having slender hind portion, broad front part, big hump, eyes beaming with splendor, soft hair, a tail soft like a rat's tail, stout and strong body without any visible physical flaws, and red hoof.

33. A bull with the following features is not only inauspicious but also destructive:

Brown, black, or red body; blackish throat, tongue, lips, ear tips, and legs; hollow hump, casting urine and dung at the same time; face appearing like that of a crow or a cat; and yellow eyes.

34. An individual rearing a cow, which has the following features, will not live happily:

Long or short neck, very big hump, improper limbs, excessive and bad teeth, sunken and asymmetric eyes, face being longer than the horns, and eyes with tears.

35. The cows with the following features not only ruin the master but also displace him:

Always gnashing teeth, depressed back teeth bent inwards, lumpy hooves, shaking horns, nodding head, blackish tongue, protruding eyes, cat eyes, half-closed eyes, atrophy and wasting diseases, flanks that stick to each other, and sparse hairs.

Goats

36. A white-headed male goat with spots of white here and there like the *Krittika* asterism, with eight or nine teeth, and which drinks water after stepping into water is the best.

Dogs

37. A dog having the following characteristics is auspicious:

Broad belly, slim and beautiful waist, dazzling eyes, three legs having five nails each and the right forefoot having six nails, reddish lips and muzzle, hanging ears, gait resembling that of a lion, and shaggy tail.

38. A bitch with the following characteristics is auspicious:

Attractive body, crooked tail, three nails in the left forefoot and five nails each in the rest of the three feet, brisk paced, and red in the mouth and eye.

Cocks

39. The cocks with the following features bring opulence to the king:

Straight talons and heel, neck that resembles the color of a leech, fat flanks, reddish nails and beak, and deep voice.

A hen with the color of a bat, a white heron, *kurikum* (red?), gray, or pigeon-like is also auspicious.

40. A king aspiring for prosperity should not rear one sheep, two buffaloes, three cows, eight horses, six dogs, and seven elephants.

41. The life span of man and elephants is one hundred and twenty years and five days, that of horse is thirty-two years, that of an ass is twenty-five years, that of camel, buffalo, and cows is nineteen, that of dog is twelve, and that of goat and other animals is sixteen years, according to the science (*shashtra*).

End of Chapter XI.

Commentaries

Commentary

Y L Nene¹

Portents (Chapter IV)

It is interesting to read this chapter having 89 verses because it gives an insight into the thinking of common people, especially those living in rural areas about a millennium ago.

These portents were properly classified into three groups; viz., celestial, atmospheric, and terrestrial. Life in that period was abounded in mysteries that resulted in portents. Many of the portents are meaningless today, but must have worked heavily upon the minds of people of that period. Today we have knowledge about halos around the sun and the moon, hanging dust, smoke drifts, untimely (cyclonic) rains, rainbow on a cloudless day, falling of meteors, and reservoirs drying suddenly; therefore, portents related to these aspects do not affect our minds today. There is one area, however, that needs to be studied carefully, and that is portents related to behavior of animals and birds. We know today that animals have instincts that forewarn them of impending disasters.

Many of the portents reflect the fear and insecurity of human mind. There is no society on this earth, which does not have its own share of superstitions (and hence portents) even today. As knowledge increases, many of today's portents will be forgotten. However, there will never be a society that does not believe in at least some portents.

It is often stated that people have far more tensions today than in the past. A reading of the portents in the present text shall convince anyone that our forefathers too remained under tension all the time.

Water divining (Chapter V)

Chavundaraya has summarized available information in 40 verses. It would be useful to recall that Brhat Samhita by Varahamihira (505–587 AD) contains 125 verses on this topic (Bhat, 1981). Chavundaraya takes most of the information relevant to southern India from Brhat Samhita. Criteria for detecting groundwater are the presence of (i) trees as bioindicators, (ii) termitoria, (iii) colored rocks, (iv) fauna such as frogs, (v) grasses, and (vi) emergence of smoke from the ground. All these are relevant. As expected, presence of certain trees and termitoria were the most common indicators.

It must be stated that the work of Varahamihira, done in the 6th century AD, served as the basic source of information through centuries and we do find this information, contained in 57 verses, with some additions, in Vishvavallabha by Chakrapani Mishra in 1577 AD (Sadhale, 2004). Many of the indicators are used even today by the rural folks in India.

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Vrikshayurveda (Chapter VI)

This chapter relates to health management of trees, bushes, creepers, etc. Chavundaraya has put the contents, relevant to southern India, in 60 verses in contrast to 300 verses that Surapala, who was probably a contemporary (Sadhale, 1996), had put together in his text. In verse 2, Chavundaraya specifies the 8 ruling constellations during which seed sowing should be done. Surapala mentioned 10, and Varahamihira specified 14. Varahamihira's region was western India, Surapala's eastern India, and Chavundaraya's southern India. This indicates that location specificity of sowing time had been learned by our ancestors through experience. Vishvavallabha, written by Chakrapani Mishra, does not specify any constellation, most likely because of the uncertainty of rains in Rajasthan in western India.

In verses 3 and 4, digging of pits for planting and distances between pits are described. Once again location specificity seems to have influenced the decision. For example, Chavundaraya specifies 2 forearm square to be the size of the pit but Surapala mentions one forearm square. Chakrapani Mishra did not suggest a size. With regard to spacing between two pits, each author gives 3 spacings qualifying them to be inferior, moderate, or good. Varahamihira indicates 12, 16, 20; Surapala, 14, 16, 20; Chavundaraya, 10, 14, 16; and Chakrapani Mishra, 12, 16, 20. Varahamihira and Chakrapani Mishra both belonged to western India and that explains their identical recommendation.

In verse 6, seed treatment prior to planting is described. This involves dressing seeds with cow dung, drying, soaking in milk, coating with extract from Indian nightshade fruits and salt water, and finally fumigating with the powder of *vidanga* seeds (see Plant Index in this volume). We note that similar recommendations were made by others. The treatments related to the perennials and not the annuals. Probably all these treatments brought the seed in a condition that they would sprout quickly. Experiments to validate these recommendations will provide answer whether all these elaborate treatments are necessary or these can be modified for convenience and ease. Clearly, annuals were not in the minds of these authors, since these texts relate to "Vrikshayurveda" and not to "Krishi"; the latter covers field crops.

There is a strange recommendation to ward off the damage by hail. This is to sprinkle plants with curd-rice. Similar recommendation was made by Surapala (verse 159). It is difficult to understand the basis of such a recommendation.

Verse 11 contains a key recommendation for insect pest control. The base used is cow urine, for one-week fermentation, in which anti-insect herbals, such as asafetida, sweet flag, *atis* root, black pepper, *vidanga*, marking-nut seed, *visala*, and black mustard were used. In addition, cow horn (powdered?) was also mixed. All the herbals should give a broad-spectrum insecticide. Cow urine is known to contain "bioenhancers" that increase efficacy of ingredients (Khanuja *et al.*, 2003). Fermentation of cow horn should release sulfur-containing ingredients from keratin. With availability of sprayers today, compared to sprinklers of the ancient period,

it should be possible to obtain excellent insect control. Similar formulation, with different locally available herbals, was suggested by Chakrapani Mishra. Surapala had suggested different herbals for smoking, plastering, etc., but the base was not cow urine. Cow urine based herbal insecticides have the potential to be popular with small farmers in villages, who cannot afford to buy commercially available preparations. In fact, I am informed by the Go-Vigyan Anusandhan Kendra, Nagpur that a US patent has been obtained for cow urine and neem formulation. This is a welcome development (personal communications from Mr Sunil Mansingka and Dr C S Nautiyal of the National Botanical Research Institute, Lucknow).

Verse 12 mentions herbals and fish meat for fumigation and to obtain “disease” control. These herbals are known to have both anti-insect and anti-microbial properties. Chakrapani Mishra mentions several more materials for the same purpose in Chapter VIII, verses 41 and 43.

Kunapa, the liquid manure based on fermenting flesh in water, after boiling, also figures in Chavundaraya’s text. He describes variants of *kunapa* in several verses. These variants offer considerable flexibility to farmers in preparing *kunapa*.

We find the procedure of grafting described clearly in verses 22 and 23. Several authors have wrongly credited West Asians and Europeans for having introduced the concept of grafting to India. Procedure of grafting had been worked out at least by 6th century AD (Bhat, 1981). In Lokopakara, the procedure of “approach grafting” has been described. Also procedure of uniting rhizomes to produce mixed flowers of lotus and a lily was described. We should, however, accept that other methods of grafting were most likely introduced by foreign invaders.

Verses 25 through 39 describe methods to obtain higher yields and better quality fruits such as mango, banana, jack fruit, coconut, sweet orange, citron, pomegranate, tamarind, jujube, bael, neem, and emblic myrobalan. Verses 43 to 52 relate to flowers. Application of materials used for *kunapa* as also several other materials was suggested. Validation of these recommendations through systematic research is bound to generate very useful and practical information, especially for small farmers. Contents of the verse 35 should be noted for the suggestion of placement of small balls or tablets of materials at the base of trees. This mode of application should be most convenient even to modern orchadists.

Contents of verse 42 are similar to those in Surapala’s Vrikshayurveda (verses 148 through 151), although some plant species are different. It is difficult to comment on these recommendations. However, we should note that both Chavundaraya and Surapala, who were probably contemporaries, but located in different regions (Surapala – eastern India; and Chavundaraya – southern India) gave strikingly similar observations about women influencing tree behavior and this warrants further research.

Perfumes (Chapter VII)

Contents of the chapter should convince anyone about the advancements made by Indians in the field of perfumery. The Atharvaveda (c. 2500 BC) could be considered the beginning of the rudimentary perfumery, which acquired definite shape in the Indian *Materia Medica* since the time of Charaka (c. 700 BC). Varahamihira in the 6th century AD (Bhat, 1981; see Part II) wrote a chapter, *Gandhayukti* (preparation of perfumes), in which he not only specified the fragrant plant species, but also indicated proportions of mixing them to obtain various combinations, resulting in many distinct fragrances. Chavundaraya indicated a very wide range of materials and preparations with specific objectives, such as scented hair oils and body oils, scented powders, scented incense, and scented toothpicks. In the modern times, perfumes are classified as floral, spicy, woody, and mossy. Chavundaraya has covered the first three kinds.

In this chapter, Chavundaraya has mentioned over 100 plant species, most of which were used in producing fragrant items and a few auxiliary items.

In verse 2, several recipes have been given to obtain a specific fragrance by mixing unrelated items. For example to obtain aroma of *champaka* flowers, powdered emerald, cardamom, and sandalwood powder were ground together. Similar recipes are given in verses 41 through 45 and verse 65.

Contents of verses 3 and 4 relate to oral hygiene. Scented tooth-sticks, powder, and fresheners are indicated. As an oral perfume, use of citron was recommended, which can be considered similar to the lemon mints today (verses 8 and 9). Preparations of a general purpose oil is described in verses 10 and 11.

It should be noted that in preparations described in verses 12 to 24, sesame oil was used for extracting essence. This is the most common method today for producing scented oils. Sesame oil is almost unique that it never becomes rancid because of its high anti-oxidant content.

Use of incense sticks and scented smokes for various purposes is very ancient. In verses 31 to 39, we find methods of preparing incenses for use as sticks, cotton buds, powders, tablets, and insect repellents.

It is interesting to note methods of extending flower scent for a longer duration as described in verses 46 through 49. Special perfumes named *sadu* have been described in verses 50 through 59.

A thorough study of this chapter will impress any reader about the innovativeness of our ancestors in developing a large variety of fragrances using mostly the herbals, but also some other materials such as the musk. Very few additions to the herbals used a millennium ago have been made. We have the base; we need to develop the spirit of competition to once again dominate the world with Indian perfumes.

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Commentary

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Lokopakara was originally written in Kannada in 1025 by Chavundaraya, a poet in the court of Western Chalukyas in the Karnataka state of India. Its English translation by Valmiki Sreenivasa Ayangarya forms the first part of the present publication. The original work is encyclopedic in nature dealing with subjects from various branches of knowledge such as astrology, architecture in conformity with the holy *Vastushastra*, water divining, recipes, medicines for humans, plants, and animals, characteristics of animals, omens, and portents. These are topics on which people needed systematic information in simple language. The present work serves the purpose of a manual on several such topics of interest to people in general. The title meaning 'a work for the benefit of people' indicates both the matter and the manner of presentation of information on the above stated topics.

This was a period of the rise of regional languages in the medieval history of India. A large number of people were gradually segregated from the knowledge of Sanskrit language. Although many commentaries on the Vedas, *Shastras*, and the two epics still continued to be composed in Sanskrit till as late as the 18th century, as is evident from many treatises, compositions in various regional languages too, were gaining esteem in the academic circles. The two popular Sanskrit epics Ramayana and Mahabharata were either already translated or were in the process of being rendered into several regional languages. Although academic activity in Sanskrit as well as in regional languages continued side by side during this period, regional languages had taken over as means of communication in most of the areas and the knowledge in Sanskrit was accessible only to those who were well versed in the language. The rulers in various regions too, encouraged literary activity in regional languages in the interest of the general public.

In Karnataka, the Chalukya kings encouraged literary and academic compositions by poets and scholars in various fields. While 'Manasollasa', an encyclopedic treatise attributed to the Western Chalukya king Someshvardeva was composed in Sanskrit, the present work 'Lokopakara' has been ascribed to Chavundaraya, a poet in the Western Chalukya kingdom and was composed in Kannada. Both are very similar in content and are the products of the same period and the same region. The literary activity of this period can be described as falling mainly in the following categories:

- Compositions of commentaries in Sanskrit on important Sanskrit texts of literature and science.

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- Translations of important and popular Sanskrit works into regional languages.
- Creative reproductions of Sanskrit epics, Puranas, and classical texts in regional languages.
- Compositions of works of encyclopedic nature both in Sanskrit and regional languages, into which was culled together useful information from earlier works.

Lokopakara falls in the last mentioned category. Rendering information on several useful and interesting topics available till then only in Sanskrit, into the languages spoken and understood by the common man was the need of this period. Lokopakara, a text of an encyclopedic nature, written in Kannada typically exemplifies this process.

Chapter IX of Lokopakara has documented in old Kannada, knowledge pertaining to animals and animal diseases which were in vogue in the north Karnataka region in the beginning of the 11th century. Chapter X deals with treatment on snakebite exclusively and Chapter XI deals with characteristics of animals. The extent to which each topic is dealt with should be clear from Table 1.

Table 1. Topics and animals discussed in Lokopakara.

Chapter no.	No. of verses	Topic	Animals discussed	Verse nos.
IX	58	Diseases and treatment	Cow (Cattle) Horse Elephant	Verses 1 to 30 (30 verses) Verses 31 to 56 (26 verses) Verses 57 & 58 (2 verses)
X	23	Snakebite	Snake	Verses 1 to 23
XI	41	Characteristics of animals/birds	Elephant Horse Cow (Cattle) Goat Dog Cock	Verses 1 to 8 (8 verses) Verses 9 to 31 (23 verses) Verses 32 to 35 (4 verses) Verse 36 (1 verse) Verses 37 & 38 (2 verses) Verses 39 to 41 (3 verses)

Looking at the statistical data of Chapters IX and XI it is evident that the author's concern here is with domesticated animals whose services man needed for various purposes. With constant observation and experience certain external characteristics were identified as indicative of desirable qualities. Chapter XI describes those characteristics which help to select the right kind of animals for serving the objectives in the best possible manner. While taking the respective services from the animals it was essential to take care of their health. Chapter IX deals with such diseases and their treatment. Chapter X deals exclusively with snakebite and the remedies as it was a considerably major problem especially in the villages. Farmers and laborers working in the fields and the village dwellers in general were often exposed to this danger.

Chapter IX of *Lokopakara*, which contains information on animal diseases and their treatment is the main topic of discussion in this commentary. It would not be out of place therefore, to discuss here briefly the origin of this science in India.

Origin of *paschvayurveda* (the science of medicine for animals)

Knowledge in ancient India grew in close association with the Vedas and the Vedic sacrifice. This science has its origin in the Vedas, too. Ayurveda, the Indian science of life is as a matter of fact, the *upaveda* (auxiliary) of Atharvaveda. It is suggested there, that much before man could think of treating animal diseases, animals due to their instinctive knowledge treated themselves and that one of the sources from which man learned his knowledge of medicines was this animal behavior. A *sukta* (8-7-23-25)¹ in Atharvaveda contains very significant mantras to the effect. They are indicative of the fact that observation of animal behavior helped man to learn the medical science.

In Rigveda, Ashvinikumaras (Nasatya and Dasra) are described as physicians of gods and have treated besides gods and humans, a cow, a bird, and a horse.² At another place³ they are praised for fixing an iron leg in place of the broken one of Vishpala, a mare.

In the Mahabharata, the two sons of Madri, Nakula and Sahadeva are stated to be born from Ashvinikumaras, the divine physicians, who were also proficient in *Ashvavaidyaka* (Horse medicine) and *Govaidyaka* (Cattle medicine). While staying incognito in the capital of king Virata, they took care of Virata's horses and cattle.⁴ Sahadeva is stated to know a very special and unfailing remedy for infertility among cows. In an exaggerated manner the point is stressed by the poet in the text stating that 'Sahadeva had only to choose a breeding bull and the cow would conceive only by smelling him!'

According to Brahavaivarta Purana, Nakula had composed "Vaidyaka Sarvasva" (The Science of Medicine in Totality). Agnipurana, Garudapurana, and many other Puranas too, contain information on the subject of treating diseases of animals.

In the Vedic days, cows were considered the most precious wealth. As man learned farming the importance of bullocks for plowing too, was known. As *krishtis* (human settlements) grew and expanded, importance of government was understood (Manusmriti VII-1). Big and small kingdoms came into existence and with them their armies to protect them from rivals (Kautilya IX-2). These armies consisted of four divisions: (1) foot soldiers and warriors fighting while riding, (2) horses, (3) elephants, and (4) chariots (drawn by horses). Thus cattle, horses, and elephants have been tamed since very ancient times and treating their diseases became an essential part of their taming. This led to the origin and growth of *paschvayurveda*, the science of medicine for animals. It must, however, be admitted that the scope of the science remained restricted to these animals.

The remedies recommended for most of the ailments and disorders of animals like horses, elephants, cattle, etc. bear a direct connection with Ayurveda. Ayurveda, the basic science of life apparently treating the subject of human diseases and their treatments, provides a theoretical basis for a better quality of life in general and of humans in particular. The science recognizes four types of life-manifestation. *Jarayuja* (womb born), *andaja* (egg born), *swedaja* (sweat produced), and *udbhijja* (sprouting). This approach in its course offers guidelines for diseases and remedies of all types of beings. [The guidelines and basic principles and practices of Ayurveda, which were extended to subjects other than the humans are discussed in detail in our article “*Vrikshayurveda in the context of Ayurveda*” (Asian Agri-History 10:9–31).] Later scholars of this *shastra* evolved independent works on specific topics focusing their attention on animals, trees and so on. Some of the important ancient works dealing with *pashvayurveda* are as follows:

- Shalihotra (Ashvayurveda) of Bhoja: Science of Horses’ Life (1800 BC)⁵
- Hastyayurveda of sage Palakapya: Science of Elephants’ Life (1000 BC)⁶
- Agnipurana (Ch. 286 to 297): Diseases and treatment of horses, elephants, and cattle
- Garudapurana (Ch. 197, 201, 207): Diseases of horses and elephants
- Chapters on Ashvachikitsa (Horses’ Diseases and their Treatment) and Gajachikitsa (Elephants’ Diseases and their Treatment) in Manasollasa of Someshvardeva
- Cattle diseases and treatment in Krishishasana of sage Parashara

The present study focuses attention on the contents of Chapters IX and X of Lokopakara as perceived in the context of Ayurveda.

Introductory remarks

It is always accepted in theory that *pashvayurveda* or *vrikshayurveda* (the science of medicine for plants) are applications and extensions of Ayurveda to forms of life other than human. The basic theories and concepts, the diseases and their symptoms, the medicines and the methods of treatment are mostly the same in these sciences as in the case of the humans. Still independent treatises were composed to deal with the science of plant life or of animal diseases obviously because in practice, the basic difference in the ‘patient’ needed qualitative and quantitative variations in medicines and treatment. While pathological and pharmacological principles should be common to a large extent, anatomical and other behavioral differences needed change in the approach to the subject. What were these changes? How did they cause variations in the treatment to justify the branching off of the sciences? To what extent a common system of medicine could still work as a basis for humans, animals, and plants? These aspects are yet to be studied in depth. This commentary on the relevant chapter of Lokopakara is a humble attempt to study the animal diseases and their treatment from this point of view.

In the treatment of cattle emphasis is on disorders of cows. The author is writing for the common man. It is a known fact that practically every family during this period in India tamed cows (or buffalos) in a small cowshed attached to the house. It is therefore, natural for the

author to focus attention on the diseases of the cow. Problems regarding calving, etc. are therefore, discussed in considerable detail. Works on agriculture, like Krishishasana, dealing with cattle diseases concentrate mainly on bullocks. The emphasis there is on diseases of bullocks as in the context of plowing it is the health of the bullocks that primarily matters. Shoulder-pain, broken leg, and limping are ailments to which the bullocks pulling the plow in the farmlands are easily susceptible. Considering these aspects, the topic handled in Lokopakara is complementary to the works on Krishishastra. Horses and elephants were in the service of kings and rich persons. The author's approach to the subject here is therefore, slightly different. The diseases of elephants are treated very briefly.

In Lokopakara, the treatments recommended are directly based on the fundamental principle of Ayurveda that imbalance of *vata-pitta-kapha* is the root cause of the animal diseases. The author, however, does not discuss the theory of medicine in the treatment of bovine diseases as the same is taken for granted. He is concerned more with the practical aspect of the science. Barring few exceptions, the author does not mention technical names of diseases or their causes and symptoms (cf. Krishishasana Ch. IV for contrast). True to the title 'Lokopakara', the scientific knowledge is written here in non-technical language for the benefit of the uneducated cattle owners who were the actual beneficiaries of the knowledge.

Snakebite, a topic dealt with in Chapter X is again concerned with the common man. The treatment recommended here by the author is largely influenced by local beliefs and superstitions. Even the drugs prescribed do not in some cases have the basis of Ayurveda.

As the title indicates, this work is intended to benefit common man and so in spirit and presentation it might appear like a compilation on folklore. Yet, as is evident from the discussion that follows, taken as a whole, the contents are firmly rooted in the *shastra*. The medical treatments prescribed in Lokopakara for curing the diseases of animals too, have a strong base in the Indian medical science, the Ayurveda.

Texts on animal diseases like Shalihotra and Manasollasa deal first with the nourishment and health of the animals and then discuss their diseases and treatment. In Lokopakara the author has not offered directions and recommendations for animal health.

Theory, symptoms, causes, or diagnosis of a disease are seldom discussed in Lokopakara. The author's approach is more direct and practical.

When in case of some diseases two or three treatments are recommended, authors of Manasollasa or Shalihotra start with the mild drugs and prescribe treatments which become progressively aggressive. In Lokopakara too, alternative treatments are occasionally recommended but without indicating the gradation or the significance of the order of their administration.

As per the principles of Ayurveda, *anupana* (fluid vehicle in medicine) makes difference to the medicine. The author of Lokopakara has used this principle in some cases by recommending different *anupanas* but is again silent regarding its significance.

Raktamokshana ("vein-losing" or "blood-letting") is a common treatment in Ayurveda. It is frequently recommended by other authors of texts on *pashvayurveda* but Lokopakara has not referred to it. Perhaps this treatment could be managed only under expert supervision and had no place in this manual intended for common man. Besides, in Ayurveda, there exist two schools, one following Charaka, which depends on the *panchakarma*-treatment (the five kinds of treatment in medicine, viz., giving emetics, purgative medicines, administering medicine through nose, eyes, etc., and enemas of two kinds, oily and not oily) known as *kayachikitsa* and the other, following Sushrita with emphasis on surgical treatments known as *shalyachikitsa*. "Blood-letting" is frequently recommended in this school. Apparently, works like Lokopakara followed the Charaka school.

The main difference in the treatments of humans and animals is the larger doses prescribed for the latter obviously due to the difference in size and weight of the animals. In some cases the author of Lokopakara has prescribed the entire plant along with the roots to be used in the preparation of a drug. Although all the five constituents (*panchanga*) of a plant, including the root are prescribed for humans too, in most cases the plant so prescribed is very small.

Approximately 90% of the medicines (and the diseases for which they are prescribed for the animals) are the same/similar to those of humans. The remaining could not be traced in the texts of Ayurveda. These may hold answers to some crucial questions regarding the subtle constitutional differences between humans and animals although both belong to the same viviparous class of beings. According to Ayurveda, forms of life differ due to difference in the ratio of the five basic elements (ether, wind, fire, water, and earth) in which 'fire' is predominant. These are manifested in the living beings as *vata*, *pitta*, and *kapha*. *Jatharagni*, the digestive fire, is most dominant in the body. In the Bhagavadgita (XV-14), Lord Krishna too, tells Arjuna, "I become *vaishvanara*, the fire of life and manifest myself in the bodies of living beings. Combined with the life-breaths I digest the four types of food." Most of the substances are administered orally and work through the fluids of food, controlled by this fire. This could be one of the reasons for difference in materials and treatment.

The method of presentation followed in the following portion of this commentary is given below:

1. The text of Chapter IX is divided into three sections, viz., cattle, horses, and elephants. Chapter X on snakebite is treated thereafter.
2. Diseases are internally classified following the text.
3. Normally, each verse deals with an independent matter. Occasionally two or more verses are combined.
4. After identifying the disease first, treatment materials prescribed in the text are listed and serially numbered.
5. Properties of the substances prescribed are then discussed and commented upon in the context of the disease. This portion is substantiated by references to the sources. Unless

otherwise stated, numbers in parentheses indicate page numbers of Dravyagunavijnana (Sharma, 1956). The Ayurveda texts of Charaka, Sushrita, and Vaghbata are the very basis of the entire commentary but specific points are substantiated by references to the respective sections, chapters, and verses/passages from these texts. Occasionally statements are substantiated by references to other texts on Ayurveda.

6. As is stated in his introduction by the translator Valmiki Sreenivasa Ayangarya, Chapter IX, originally consisting of 246 verses is abridged to 58 verses, i.e., to less than a quarter of its original size in the present publication. Chapter X, originally consisting of 53 verses is abridged here to 23 verses, i.e., to less than half of the original size. The observations, remarks, and comments made here are restricted to this portion. Most of the plant names are given in Sanskrit (see Plant Index in this volume).

Cattle diseases and treatment (Chapter IX)

Barrenness (*Vandhyatva*)

V 1 – Treatment:

Pour ghee from goat or sheep milk into the vulva of a barren cow. Also, pour crushed juice of *ushira* roots on the vulva. This helps in the embryo formation.

Barrenness or sterility is a serious disorder among cows. It is either absolute or relative according to Ayurveda and is caused among cows as in women due to several factors including general weakness. The present text does not mention any particular cause for the condition but the treatment suggested here is external and indicates that the general health or condition of internal reproductive organs like uterus is probably not the cause of barrenness. It is to be guessed from the treatment that the barrenness is of the relative type and is caused by some external factor like wound or unhealthiness of vaginal track (*yonidosha*). Charaka describes several vaginal disorders⁷ of women leading to barrenness. If the cause here is internal disorder, from the materials prescribed here in the treatment it may be guessed that excessive heat caused by imbalance of bile (*pittadosha*) is the main cause of sterility referred here. Due to this the discharge is dark and foul-smelling that could lead to presence of bacteria in the vulva and vaginal canal which would further obstruct the formation of embryo.

Sheep ghee (any ghee in general) acts as a wound healer⁸ and ghee made from the milk of she-goat⁹ is stated to be a cure for disorders caused by any one of the three *doshas* and is particularly recommended for vaginal disorders (Sushrita, Su. 45-101). Ghee also acts as an antidote for swelling, burning, and pain. Juice of *ushira* has a cooling property.¹⁰ The treatment thus sets right the possible *pittadosha* removing the obstructions in the embryo formation.

External treatment for sterility of women is recommended in Ayurveda¹¹, too.

Dead calf entangled in the uterus (*Mritagarbha*)

V 2 – Treatment:

Feeding powdered mixture of seeds of *bakuchi* (*bavchi*?), *tila*, field bean (*Lablab purpureus*) (Sanskrit parallel could not be found), and *agasthya* to the cow or buffalo.

As per Ayurveda, the seeds of *bakuchi* are a nerve tonic, stimulating heart and the circulatory system. They also are stated to be aphrodisiac (Gogate, P 436/437). The seed strengthens the uterus and stimulates contractions to push out the entangled calf. Its lubricating quality reduces pain. *Tila* (sesame) promotes menstrual discharge and strengthens the uterus inducing contractions (Bhava. 652). Sanskrit parallel for field bean could not be traced. The flowers of *agasthya* stimulate the uterus for menstrual discharge (Bhava. 509). In this case the stimulation helps the cow in pushing out the calf.

Retention of chorion (*Aparavarodha*)

V 3 – Treatment 1:

The cow is administered with the powdered mixture of *agasthya*, *mudga* (greengram), field bean, *bakuchi* seeds, *kantakari* berries, *tila* oil cake, and whole plant of *katutumbi* (along with the roots) ground in milk or liquor.

To understand the rational of the treatment materials, it is necessary to infer the cause for retention of the chorion from the treatment prescribed. The animal, after delivering the calf is both hungry and is in a state of exhaustion. The vacuum caused in the uterus activates *samana vayu* (the wind responsible for hunger, food intake, and digestion) and pulls the chorion upwards. Or due to sudden and forceful expulsion of the calf the naval tube is snapped and pushed upward along with the chorion and the cow has no further strength to push it out. In this condition immediate nourishment for the cow is the remedy and the treatment consists of nourishing and strength giving substances.

Properties of *agasthya*, *bakuchi*, and *tila* are discussed earlier. Greengram, besides being nourishing, is light and easy to digest. *Kantakari* is stimulating and acts on the uterus. *Katutumbi* is nourishing and strengthening and helps the cow to push out the chorion.

V 4 – Treatment 2:

Tie the seed of *gunja* or *durva* to the neck of the animal.

Besides cows, this treatment is prescribed for mares, cow elephants, etc.

The *gunja* seed is a poison (Dravya. 601). According to Kaiyyata, it expels the evil caused by demons, stars, and poisons (602). But it is a stimulant for the nervous system. Tying the seed on the neck would stimulate *sushumna* (the main artery or vein) which would stimulate the entire nervous system. The root of *gunja* is used for aborting embryo (602). In the present case it can eject the chorion. *Durva* when administered orally controls bleeding and heals

burning sensation of the urinary tract. (Tied externally on the neck it acts as a stimulant for blood circulation.) This treatment of tying herbs externally comes under *Atharvani chikitsa* (treatment consisting of formulas and spells). In Ayurveda, medicinal materials act through five channels one of which is '*prabhava*', a phenomenal power of a herb which defies logical explanation.

Cow eats its chorion after delivering the calf

V 5 – Treatment:

Susalu (see translation), *guda*, i.e., jaggery (raw sugar), and *agasthya* are ground in milk (Bhava. P. 759).

On delivering the calf, the cow is both exhausted and hungry. If immediate nourishment is not given, it is common for cows to eat the chorion. *Susalu* and jaggery provide nourishment while *agasthya* and milk are prescribed as nourishment for restoring strength.

Signs of possible premature delivery (*Akalaprasutisambhava*)

V 6 – Treatment:

Wash the partly expelled embryo with sour gruel and smear with juice of *kakamachi* fruits or *apamarga* root, and push it back with fist.

Sour gruel contains acid of food grains and is recommended (AH.V 80) for reinstating. This may help in reinstating the embryo. *Kakamachi* is an antidote for the three *doshas* and for pain (Bhava. 438). *Apamarga* roots are recommended for stopping bleeding (Bhava. 416). It can push *apana vayu* (having natural downward movement) upward causing contraction of the embryo impeding its downward movement.

Rejection of newly delivered calf

V 7 – Treatment:

Anoint the calf with the paste of *musta* rhizomes, *lavana*, and cumin ground in buttermilk. Place the calf before the cow.

Musta gets rid of skin deficiencies in the calf. Such deficiencies or other skin problems of the calf could act as a repellent and their removal can attract the cow to the calf. *Musta* rhizomes are also prescribed for purifying and increasing the quantity of milk of a new mother (305) and the same in the cow can lead to increased affection towards the calf. *Lavana* (salt) purifies *strutas* (channels conveying nutrients to the body) and enhances secretion of digestive fluids. It also acts as an appetizer (Charaka. Su. 46; Bhava. 154). This can prompt the cow to lick the skin of the calf. Cumin has a strong agreeable aroma which stimulates taste buds (Charaka. Su. 46). This can attract the cow to the calf. It is a pain remover (303) and can

give relief to the cow. Buttermilk is nourishing and increases the quantity of milk of a new mother.

Fierceness in the cow

V 8 – Treatment 1:

Kramuka wood ground in goat urine is applied to the eyes of the cow.

Kramuka has a calming effect on the heart. It reduces increased blood pressure and emotional surge (586). Goat urine is sharp, astringent, and an antidote for humor-imbalance (Charaka. Su. I-100). Choice of this antagonistic substance could be suggested as a vehicle (*gamitva*) for quick result. Smearing of the eyes is technically known as *anjanakarma* and is one of the common remedial measures recommended in Ayurveda. The actual theory of this method of treatment and the logic behind it could not be traced. However, it is traditionally in practice and its good results have been experienced. It is a matter of common experience that any sharp substance put in the eyes causes a sudden contraction as a defensive reflex and an instinctive withdrawal of all physical faculties. In the present case this might reduce the fierceness of the cow and make it more amenable.

V 8 – Treatment 2:

Grind *rajika*, *vacha*, and *varuna* (*barna* in Hindi?) seeds in goat urine and smear the cow's eyes with the paste.

Rajika is pungent and fiery and has a strong smell. It is prescribed for fits (109). *Vacha* is used as a tranquilizer in intoxication (23). The properties of goat urine are discussed earlier. The treatment of smearing the eyes pacifies the cow.

Stone mortar is specifically recommended as the original properties of substances are not wasted in the process of slow grinding.

A savage cow refuses to give milk

V 9 – Treatment:

Grind roots of *agnimantha*, *garbhada*, *kantakari*, and *arka* with salt in buttermilk in a stone grinder and anoint the cow with the paste.

Agnimantha removes *kapha* and *vata* imbalance, purifies the food channels, and acts as an antidote for *tamoguna* (mental darkness, ignorance) suppressing savagery and promoting gentleness (182). *Garbhada* is also known as white *kantakari* and removes obstructions in embryo formation like the other *kantakari*. Since it promotes motherhood, it also causes gentleness. *Arka* purifies food channels and increases breast milk. It develops tenderness in the cow. The properties of salt and buttermilk are discussed earlier.

Mouth diseases (*Mukharoga*)

V 10 – Treatment 1:

Wash mouth with hot water. Grind leaves of *arka*, in oil of *sarshapa*; add sesame oil and smear the cow's mouth with the paste.

Arka removes worms from the teeth (355). *Sarshapa* kills worms (Sushrita Su. 45). Sesame heals wounds and stops bleeding (101). Chewing sesame seeds strengthens weak teeth (Sushrita Su. 46).

V 11 – Treatment 2:

Wipe the cow's mouth with a crow's plume. Wash with hot water. Smear with the paste of dry ginger, *pippali*, and *maricha*.

A crow's plume is used for gently wiping the slavering. Hot water is used for effective cleaning and destroying germs. Dry ginger cures *kapha* imbalance and slavering (263–265). *Pippali* cleans the tongue and throat and acts as a complementary (*yogavahi*) substance (Bhava. P. 222). *Maricha* kills germs, expels phlegm, and gives relief from acute toothache (295).

Cough (*Kasa*)

V 12 – Treatment 1:

Administer paste of *sharapunkha* (wild indigo) in gruel.

Indigo expels phlegm (440, 442). The gruel cures *kapha* and *vata* imbalance and alleviates breathlessness (AH. V 79, 80). It cures thirst and fever by touch and removes *kapha* and *vata* when consumed (Cha. Su. 27-192).

V 12 – Treatment 2:

Administer paste of *agasthya* leaves, cow's buttermilk, and rice wash.

Agasthya expels phlegm (Sushrita Su. 46). Buttermilk cures *kapha* and *vata* (AH. V 33). Rice water acts as an appetizer and improves digestion (Cha. Su. 27-191).

Albugo

Albugo is eye-affliction caused by white opacity in cornea.

V 13 – Treatment 1:

Burn *arka* plant kept in a wooden shell. Prepare ointment with the ash in butter and apply.

Arka cures itching, wound, and swelling (352–355). Butter has a cooling effect and cures blemishes in *vata*, *pitta*, and blood (AH. V 35, 36).

V 13 – Treatment 2:

Anoint ground paste of *gunja* roots.

Gunja removes imbalance in the three *doshas* and cures eye diseases (600, 602).

Swelling (*Shotha/Shvayathu/Shopha*)

V 14 – Treatment:

Grind *bhumyamalaki*, salt, marrow juice, roots of *patalagaruda*, and *bimbi* at the death place of otter in liquor and apply.

Bhumyamalaki cures swelling (496, 497). Salt also cures swelling and alleviates pain (753). Marrow is recommended in swelling caused by *vata*. It is sweet and gives strength (Ch. Su. 27-295). *Patalagaruda* removes symptoms caused by *kapha* and *vata* and is a remedy for swelling caused by them. *Bimbi* too, cures swelling (432). The specific place of treatment may be some local belief or practice. Its medicinal significance, if any, could not be traced. Liquor is also a remedy for swelling (Ch. Su. 27-181).

Swollen belly (*Adhmana*)

V 15 – Treatment:

Grind with water in a stone mortar, whole plant of *marisha*, rock salt, unripe *bilva* fruit, *nirgundi* leaves, buds of *vata* (banyan), *dhattura* roots, lotus rhizomes, and whole plant of *potaki* and administer the paste orally.

The white variety of *marisha* improves digestion and the red one acts as a purgative (Bhava. P. 665). Rock salt is particularly recommended for stomach diseases (AH. Su. VI 144). *Bilva* is an antidote for acute stomachache and improves digestion (Cha. Su. 25). *Nirgundi* cures bloating of stomach (60, 62). *Dhattura* is a pain reliever, cures swelling, and contractions (Bhava. 317). *Potaki* cures constipation (Cha. Su. 27; Bhava. 665). *Vata* (banyan) and lotus could not be traced.

Stomachache (*Udarashula*)

V 16 – Treatment:

Administer orally after grinding ginger, garlic, *gajapippali*, *maricha* creeper, *hingu*, *vanaharidra*, raw sugar, salt, *haridra*, *vacha*, and *yavani* together with water.

Ginger cures loss of appetite and removes *vata* in stomach (263). Garlic is digestive; it relieves pain and regulates *vata* (65). *Gajapippali* is recommended for loss of appetite, indigestion, and acute stomachache (223). *Maricha* helps digestion and appetite and

regulates *vata*. *Hingu* also helps digestion and appetite, relieves pain, and regulates *vata* (299). *Vanaharidra* regulates *vata*. Raw sugar prompts eviction of urine and faeces (AH. V 47). Salt is digestive, purgative, and removes *vatadosha* (Chara. Su. 27-304). *Haridra* regulates *vata* (133). *Vacha* removes acute stomachache (21, 22). In addition to helping digestion and removing pain, *yavani* also destroys worms (396).

Fever (Jvara)

V 17 – Treatment 1:

Administer orally, juice of crushed *vanamallika*.

Vanamallika is ‘*tridoshahara*’, i.e., remover of imbalances in all the three humors. Its specific recommendation for fever could not be traced.

V 17 – Treatment 2:

Administer decoction of *nirgundi* and neem leaves.

Nirgundi cures indigestion, brings down temperature, and is particularly recommended in typhoid (60). Neem too, cures indigestion and is particularly recommended for fever attacking at regular intervals (Lasting for long period – *kalikajvara*) (123).

V 17 – Treatment 3:

Administer well-stirred hot decoction of *kulattha* and *varahikanda*.

Kulattha destroys germs and alleviates fever (509). *Varahikanda* also cures fever, besides being strength restorer (Bhava. 387).

V 18 – Treatment 4:

Smear ashes from burial ground of low-caste people. Also, smear ashes of burned chain viper.

The properties of these could not be traced. Perhaps they came into vogue due to some local notions.

Fever is a common disease among animals and is referred in the *shastra* by different names in different subjects. Fever among cattle is known as ‘*ishvara*’ (powerful). Perhaps the name indicates that it is the most prominent disease. Strangely, however, Krishhasana has not mentioned it specifically.

Nervous disorders (Nadivikara)

V 19 – Symptoms:

Sighing, hissing, drooping ears, and falling unconscious. This indicates vitiation of *kapha*.

V 19 – Treatment:

Administer paste of rock salt, mustard, rice grits, *maricha*, saltpeter, natron, and ginger along with rice gruel.

Rock salt is a pain reliever and is recommended for heart disorders (AH. Su. VI 144). Mustard is recommended for nervous disorders (108). *Maricha* regulates *vata* (Bhava. P. 17). Ginger stimulates the functioning of heart and nerves (263). Rice gruel cures heart disorders (Cha. Su. 27-191). Significance of other substances could not be traced.

V 20 – Symptoms:

Swollen stomach, lime smell from mouth, and folded tongue. These indicate vitiation of *pitta* leading to nervous disorder.

V 20 – Treatment:

Stretch out the tongue and smear the mixture of tamarind and salt on the fold of the tongue.

Tamarind causes slavering (Dravya. P. 284). Salt is recommended in vitiation of all the humors.

Folding of tongue is stated to be a symptom and the treatment is also aimed at the symptom rather than the disease.

V 21 – Symptoms:

Suspended ears, stiffness of body, and squinty and drooping eyes. These indicate vitiation of *vata* causing nervous disorders.

V 21 – Treatment 1:

Smear ash of burned silk thread into eyes. This is *anjanakarma* which is explained earlier.

V 21 – Treatment 2:

Apply juice of neem fruits into the ears.

V 21 – Treatment 3:

Cauterize from ear to heel. This is *agnikarma* and is recommended in the treatment of nervous diseases.

The three treatments stated above are peculiar and it is difficult to understand the logic behind them. They are quite often recommended for human ailments in Ayurveda. Although the methods and materials used are described, the exact way they work is not explained in the *shastra*.

Twisting disease

The disease is a kind of nervous disorder.

V 22 – Treatment:

Loosen the nerve of the nostril opposite to the side on which the cow falls on twisting.

This method of treatment is known as *shiravimochana* (relaxation of nerves by rubbing, etc. for removing any possible obstruction that would cause twisting) in Ayurveda and is intended to regulate blood circulation. It is an accepted fact even in the modern medical science that the nerves from the right side of the brain control the left side of the body and vice versa. Probably the nerve center located in the nostril is quite sensitive and powerful. The method of treatment suggested here is corroborated.

Non-rumination (*kogile*) (*Aruchi*)

V 23 – Treatment 1:

Smear eyes with the paste of *trikatu* (mixture of three pungent substances, viz., *shunthi*, *maricha*, and *pippali*) (see verse 8).

Here the substances are oily and therefore, gentle and soothing. These act on the nervous system, relaxing it and promoting thereby the natural function of rumination.

V 23 – Treatment 2:

Smear eyes with paste of cotton-seed flour mixed in ghee.

See note above.

Waning (*Kshaya*)

V 24 – Symptoms:

The symptoms given here are similar to those of decay of flesh (*mansakshaya*) (Cha. Su. 17-65) and decay of fat (*medakshaya*) (Cha. Su. 17-66). To counter this disease the treatment that causes growth and appetizing is prescribed.

V 24 – Treatment 1:

Grind *patalagaruda*, *girikarnika*, and *kanthari* with rice water and administer orally.

Patalagaruda stimulates the digestive ‘fire’ (*jatharagni*), helps digesting the previously eaten but undigested food and consequently nourishes the cow (Drava. P. 605). *Girikarnika* is better known as *aparajita*. It is an antidote for disorders of all the three *doshas*. It also cures indigestion. It is also known to stimulate intellect and memory (Bhava. 342). If the physical waning is caused due to any mental weakness this can counter the same. *Kanthari* could not be traced. Rice water is nourishing.

V 24 – Treatment 2:

Tie bottle gourd to the neck of the animal.

According to Sushrita (Su. 45), bottle gourd (*katutumbi*) removes the *doshas* accumulated in the lower abdomen. Apparently the waning here is presumed to be caused by feebleness of digestive power that causes constipation. In the waning state any strong purgative can deteriorate the condition of the animal further. Hence a milder treatment is recommended in this case. The science of Ayurveda recognizes ‘inhaling of smell’ as one of the means of treatment for emesis and purgation. Here the bitter smell of the bottle gourd can act as a purgative without harming the cow as it acts due to the inhalation of the smell after getting gradually absorbed with the body constitution. The tying of the gourd to the neck is recommended for continuous inhalation.

Boils of gum

V 25 – Treatment:

Apply to the boil the paste of *haridra*, *surasa*, *adhapushpi*, *madar* (Dravya. 134, 542, 192, 352), *dhattura*, and *rasna* (Bhava. 319, 79) cooked in cow’s butter.

All these substances having various properties have some common properties which are relevant here. All destroy bacteria, remove itching, cleanse, and heal wound by scraping the affected tissues, and relieve pain.

Boils of hoof

V 25 – Treatment:

Cut the boil and apply paste of *ketaki* and rock salt prepared in buttermilk.

Ketaki kills bacteria, cleanses, and heals wound (Bhava. 118). Rock salt removes pain and stimulates nerves (Dravya. 755). Buttermilk relieves pain and reduces swelling (Cha. Su. 27-229).

Boils on the nerves

V 26 – Treatment 1:

Cook in sesame oil, *zingini*, *vatama*, *lata karanja*, *arka* juice (or milk), *maricha*, *vanaharidra*, *shunthi*, and *indravaruni* and apply the same mixture.

Sesame oil is helpful in treating fracture. It cleanses and heals wound, and removes pain (Dravya. 100). *Zingini* heals wounds. Oil made from the bark is applied to chronic wounds (Bhava. 532). *Vatama* strengthens the nervous system (Dravya. 576). *Lata karanja* removes swelling, heals wound, and relieves pain (Dravya. 539). *Arka* too scrapes, cleanses, and heals wound, and removes pain (Dravya 352). *Maricha* is sharp and stimulates the digestive fire. It destroys insects and removes pain (Dravya. 299). *Vanaharidra* purifies blood vitiated by imbalance of *vata*; it is an antidote for poison (Dravya. 135). *Shunthi* removes swelling and pain (Dravya. 263). *Indravaruni* removes the abscess, kills germs (Dravya.), and heals the wound.

V 26 – Treatment 2:

Apply cooked juice of *chincha* leaves on the boil.

Chincha removes swelling, purifies blood, removes pain, and cures any complications resulting from wound (Dravya. 284).

Worms in the horn

V 27 – Treatment 1:

Tie dog's skull to the neck of the animal.

The skull comprises very fine cavities which attract the worms as a safer dwelling. In this process a large number of worms can be removed in one attempt.

To save an item from flies, ants, etc., it is a common practice to place another more attractive substance nearby to tempt them away from it. Perhaps the same principle is made use of in this case.

V 27 – Treatment 2:

Grind roots of *utkanta* with rice (?) and paste it on the horns.

Utkanta is hot and sharp (Bhava. 814). Rice is nourishing. The paste applied to the horns can stifle the remaining insects which would try to come out and get entangled in the paste and will be finally destroyed by the sharp and hot *utkanta*. (The derivative meaning is *ut+kantaka* = *utpaatayati kantakan* = that which uproots thorns or thorn-like pain.)

Swelling of shoulders (*Skandhashotha*)

V 28 – Treatment 1:

Apply mixture of madar ash, juice of *bhringaraj*, and salt to the shoulder. Madar removes pain and reduces swelling (352). *Bhringaraj* also removes swelling caused by *kapha* besides being antidote for poison (103). Salt removes pain and drives out the imbalances of *doshas* (755).

V 28 – Treatment 2:

Prepare ointment by cooking the following materials in sesame oil and apply it to the swollen shoulder: *lajjalu*, *haridra*, *shalmali* (seeds), *guggulu*, *haritaki*, *sadapaha*, *apamarga*, and *kramuka*.

Sesame oil is particularly recommended for curing wounds. Being oily it reduces *vata* and lessens pain. It is the best medium recommended for ointments (100). The other materials, besides having different properties of their own, have one common property which is removing swelling and pain. The combined effect of all therefore, must be very effective (569, 134, 394, 48, 587, 83, 417, 559).

Weakness (*Daurbalya*)

V 29 – Symptoms:

These are almost identical with those of the disorders of the digestive canal mentioned by Charaka (Vi. V-8).

V 29 – Treatment:

Administer decoction of *shunthi* and *nimba* leaves or bark.

Shunthi digests the previously undigested food and stimulates the digestive fire (263). *Nimba* purifies blood and through it can remove the disorders of liver as they are mostly caused by impurity of blood. Other properties directly connected with weakness could not be traced (122).

All types of diseases (*Sarvarogachikitsa*)

V 30 – Treatment:

Grind in gruel and sesame oil the following and administer orally: *dronapushpi* (540), *nirgundi* (60), *katutumbi* (313), *madar* (352), *sarshapa* (124), *nagavalli* (258), and *nimbuka* (Bhava. 595). This treatment cures ninety-nine (?) diseases of cattle.

All the substances recommended here possess the following relevant properties: enhancing digestive fire, digesting previously undigested food, purification of seven basic elements (chyle, blood, flesh, fat, bone, marrow, and semen), stimulating the taste buds, regulating the function of *apana vayu*, and energizing. All these appear to be related primarily with the digestive system which suggests that just as in humans the proper functioning of the digestive system is the basis of good health, so also in all other beings.

Treatment of horse diseases (Chapter IX)

V 31:

This is an introductory verse. The author deals here with the theory of the diseases and treatment of horses. He states here that the disorders of horses are also due to the disorders of the *tridoshas*. Indirectly he suggests that the disorders of cattle too, are due to the disorders of *tridoshas*. Thus it is expressly stated here that the sciences like *ashvavaidyaka* and *govaidyaka* are based on the fundamental principles of Ayurveda. These and similar statements in this section on horses discussing the theory of the *shastra*, suggest that the readers/listeners which the author envisaged were two different groups of people. One group to whom the section on cattle appears to have been addressed included the masses for whom the practical application of the *shastra* was more useful while the other for whom the section on horses was intended included the upper classes, kings, army officers, physicians qualified in Ayurveda, wealthy people, and tradesmen who were also interested in learning the theory of the *shastra*.

Disorders of digestion (*Ajirna*)

V 32 – Treatment:

Administer orally the paste of the following ingredients prepared with buttermilk: roots of Indian *vatama*, leaves of *vasaka*, roots of *katuka*, *indravaruni*, leaves of *nirgundi*, *brahmi*, leaves of *nimba*, *hingu*, *vidanga*, leaves of *madar*, roots of *girikarnika*, *vanaharidra*, roots of *chitraka*, and roots of *patola*.

As stated earlier in the introductory verse, increase and decrease in digestive fire is the result of disorders in *vata* and *kapha*, respectively. *Vatama* is described as enemy of *vata* (*vatavairi*) (576). *Vasaka* stops diarrhea (199). *Katuka*, when consumed in a small quantity, stimulates the taste buds and digestive fire and cures disorders of liver. When consumed in a large quantity it cures constipation and gastric trouble and acts as a cure for other digestive disorders through purgation (349). Similarly, *indravaruni*, in a small quantity, stimulates taste buds and digestive fire, digests previously undigested food, stimulates functioning of liver, and gets rid of excessive bile. When consumed in a large quantity it acts as a purgative (347). *Nirgundi* has the same properties as *indravaruni*. In addition it also kills worms (60). *Brahmi* stimulates digestive fire and acts as an antidote for purgation (3). In addition to stimulating tastebuds and functioning of liver, *nimba* kills worms and acts as an instant antidote for purgation (122). In addition to other properties that help improve digestion, *hingu* subsides stomachache and regulates the function of *apana vayu* which is responsible for excretion and discharges (28). *Vidanga* has the same properties as *hingu* besides killing worms. Besides other properties, *madar* clears out excessive bile. *Girikarnika* is an antidote for poison and acts as a mild laxative. *Vanaharidra* regulates the function of *apana vayu* and kills worms. *Chitraka* is specially recommended for digestion. *Patola* has almost all the properties helpful for curing digestive disorders.

In the list of ingredients recommended above, *chitraka* is the only commonly used medicine for indigestion in Ayurveda. The author has prescribed its combination with several other herbs which certainly have the properties of curing digestive disorders but are not specifically recommended for humans. In the treatment of horses (animals of a lower order in general), it is the specific digestive fire due to which the treatment varies.

Increase in the body temperature due to increase of *pitta* (*Pittajvara*)

V 33 – Treatment:

Liquid diet in the morning, salt and other medicines (?) in the afternoon, and decoction of *kulattha* and its products in the evening.

Temperature in horses is called ‘*abhitapa*’ (Palakarya, Maharogasthan Ch. 9 as cited by Tripathi in Charaka, Ni. 1-16; Manasollasa, II-6-639). Each one of the three *doshas*, *vata*, *pitta*, and *kapha* according to Ayurveda are of five types (Cha. Su.). It is the *pachaka pitta*

(*pitta* related to the digestive fluids) which causes indigestion leaving undigested food in the stomach. This leads to rising of body temperature through the *bhrajaka pitta* (*pitta* that regulates body temperature). Although fever is primarily connected with vitiation of *pitta* the other two *doshas* are also causative factors for fever by vitiating *pitta*.

Liquid diet given in the morning (at the start of the fever?) is as good as fasting which is recommended when there is undigested food in the stomach vitiating *rasa* element. Besides, being liquid, it expels that undigested food. In addition, being possibly hot, it cures *kapha*. Salt (755) and other digestive medicines (given in the afternoon, i.e., midday) counter the vitiation of *pitta*. Salt also causes sweating which reduces temperature. Decoction of *kulaththa* (given in the evening) counters fever by regulating *vata* (Dra. 509). The total treatment thus, removes disorders of all the three *doshas*. Although the author gives only *pitta* as causing the fever, from the treatment it can be inferred that vitiation of all the three *doshas* is involved here. According to Ayurveda, the three *doshas* which are normally enumerated as *vata*, *pitta*, and *kapha* become dominant in a reverse order¹² in the context of age, day, night, and intake of food. For instance, in the case of a day, *kapha* is more dominant in the morning, *pitta* in the afternoon, and *vata* in the evening.

The general line of treatment of fever in Ayurveda is summarized in a verse¹³ as follows:

“Fasting is stated to be beneficial at the start of the fever. Salt along with (digestive) medicines is recommended in the middle of the fever. Medicines which act as antidotes for fever should be given at the end and mild purgative should be administered after the temperature comes down to normal.”

The author of Lokopakara has very ingeniously made use of these principles of Ayurveda in this case.

Disorders of *pitta*, *kapha*, and *vata*

V 34 – Treatment:

A paste of the following ingredients is common for all the three disorders: *rasanjana* (decoction of the powdered roots of *daruharidra* mixed with milk and made into a collyrium by dehydration), *haridra*, *pippali*, rock salt, roots of *rasna*, *yashtimadhu*, *shunthi*, and lac.

The method of preparing *rasanjana* described here exactly tallies with the Ayurveda texts. *Rasanjana* is prescribed as the best medicine for eye diseases of humans (AH. P 25). *Daruharidra* cures disorders of *kapha* and *pitta*. It stops bleeding which is caused by disorder of *pitta* (413). According to Charaka (Su. 27-222), goat milk should be used in this preparation which is an antidote for *pitta*. *Haridra* is an antidote for the vitiation of all the three *doshas* (133). *Pippali* sets right the vitiation of *kapha* and *vata* (222). Rock salt counters the disorders of *kapha* and *vata* (755). *Rasna* cures disorders of *vata* and *kapha* (Bhava. 79). *Yashtimadhu* counters vitiation of *vata* and *pitta* (207). *Shunthi* sets right *kapha* and *vata* (263). Lac pacifies vitiated *kapha* and *pitta* (708).

This paste has to be used with three different media for different results as follows:

1. Mix the paste in goat's milk and place tablets (or paste) in the nostrils to cure *pitta* disorders. This is for pacification of *pitta* (Ch. Su. 27-222).
2. Mix the paste in cow's urine and place the mixture in the nostrils to cure *kapha* disorders. This counters *kapha* vitiation (AH. Su. 5-82).
3. Mix the paste in hot water and apply the mixture in the nostrils to cure *vata* disorders. This cures *vata* disorder (AH. Su. 5-16).

The use of *rasanjana* as the name suggests is for the eyes in the case of humans but here the same in combination with other herbs is to be used in the nostrils of the horse. This suggests that in the case of horses the controlling nerve center of the three *doshas* is located in their nostrils.

(Symptoms of the three disorders are not stated.)

Snot (*Pinasa* or *Pratishyaya*)

V 35 – Symptoms:

Horse snivels with watery, turmeric yellow, or white phlegm.

V 36 – Treatment:

Pulverize *devadaru* roots, rock salt, rhizomes of *musta*, fossil salt, *vidanga*, and *swarjikshara* and mix well by stirring in sesame oil and cow's urine and apply the paste in the nostrils.

The three types of nasal discharge indicate the disorders of *vata*, *pitta*, and *kapha*, respectively. *Devadaru* reduces excessive *vata*, melts *kapha*, and expels it. It cures chronic cold (67). Rock salt melts *kapha* and *pitta* and facilitates their expulsion (755). *Musta* pacifies vitiated *kapha* and *pitta* (304). Fossil salt cures *kapha* disorder (755). *Vidanga* pacifies vitiated *kapha* and *vata* and expels through nose the impurities accumulated in the head due to vitiation of the three *doshas* (402). *Swarjikshara* counters *kapha* disorders (168). Sesame oil is stated to cure all types of diseases (Cha. Su. 27). Cow's urine expels excessive *kapha*.

Phlegm (*Kapha*)

V 37 – Treatment:

A pack (pouch) of leaves of the following ingredients should be warmed and applied repeatedly to the face: *shirish*, wheat, *chichinda* (Should it be *chinchada*, i.e., *apamarga*?), *vasaka*, *saptaparni*, *bilva*, *gambhari*, *patala* and *eranda*.

Shirish is an antidote for all the three disorders but is especially recommended for *kapha* (Dra. 602). No properties of wheat particularly targeted at *kapha* could be traced. As a matter

of fact, most of its properties are favorable to *kapha*. The imbalance of a *dosha* can either be pacified when slightly on the excess or evicted when very much in excess. If it is not low enough for pacification and high enough for ejection it would be necessary to slightly increase the imbalance by materials which are favorable. If given with other antagonistic substances it can be helpful in the treatment. Being a food item it stands a better chance of affecting the disorder speedily. Once *kapha* is sufficiently increased the antagonistic drugs can easily evict it (Cha. Su. 27-21). *Chichinda* is also favorable for the increase of the *kapha* disorder and can be utilized in the treatment as stated in the case of wheat (Dra. 534). If there is a printing error by any chance, and the substance is 'chinchada' (Hindi) (*apamarga*, *Achyranthes aspera*), it is especially recommended for expulsion of *kapha* and is stated to be the best medicine for expulsion of all impurities accumulated in the head. The head is stated to be the primary location of *kapha* (417, Ch. Su. 15). *Vasaka* is an effective expeller of *kapha* (199). It is a commonly known medicine for cough and is used even in allopathic medicines. *Saptaparni*, *bilva*, *gambhari*, *patala*, and *eranda* are all expellers of phlegm (535, 180, 188, 186, 51).

Snot is mainly caused by phlegm. In the previous verse, *vata* and *pitta* are also additional causative factors according to which the treatment is recommended there. Here the main cause is targeted by the treatment.

Cough (Kasa)

This too, is mainly caused by phlegm. However, *vata* and *pitta* too can be causative.

V 38 – Treatment:

Grind the following substances: roots of *kantakari* and *brihati*; leaves of *nimba*, *nirgundi*, and *vasa*. Prepare the decoction of this powder with cow urine. Add powder of *shunthi* and *bharangi* to the decoction. Administer this orally.

All the substances are mainly antidotes for cough in addition to having their individual properties. None is favorable to cough (225, 227, 122, 60. 199; AH. 25, 82; 263, 239).

Acute pain (Shula)

V 39 – Treatment 1:

Mixture of *pippali* and *saindhava* to be placed at different places.

Pippali subsides excess of *kapha* and *vata*. It is particularly recommended as a pain reliever (222). *Saindhava* also relieves pain by cleansing the canals (755).

V 40 – Treatment 2:

Mixture of salt, *pippali*, *vacha*, *rajika*, immature fruits of *pundarika* (?), *shunthi*, (cow) buttermilk, *kanji* (*dhanyamla*), and *tila* oil to be placed in the nostrils of the horse.

Properties of salt and *pippali* are discussed earlier. *Vacha*, *rajika*, and *shunthi* are recommended for abating pain (21, 107, 263). Buttermilk cures pain caused by undigested food and excessive phlegm in the stomach and decreases swelling of the belly (Cha. Su. 27-229). *Kanji* cleanses the stomach and removes the pain (AH Su. 5-79, 80). *Tila* also removes pain and pacifies excessive *vata* (100). Since no pain in the body occurs without the imbalance of *vata*, this is useful in the treatment.

V 41 –Treatment 3:

Mixture of *panchalavana* (five salts), *hingu*, *pippali*, *shunthi*, immature fruits of *tinduka*, *dhanyaka*, *haritaki*, *durlabha*, *atis*, roots of *chitraka*, and *yavani* in equal proportion mixed in liquor to be orally administered.

Panchalavana relieve pain, cleanse canals, and set right the functioning of *vata* (755-757). *Hingu* relieves pain and kills worms (Dra. 282). *Pippali* relieves pain and pacifies excessive *vata* (222). Besides removing pain, *shunthi* also reduces swelling (263). *Tinduka* pacifies disorders of *kapha* and *pitta*. *Dhanyaka*, removes pain and swelling and pacifies burning sensation (Dra. 253). *Haritaki* pacifies disorders of *vata* and removes pain. *Durlabha* pacifies burning sensation and cures putrefaction. It is also a wound healer (250). *Atis* pacifies the disorders of all the three humors, *vata*, *pitta*, and *kapha* (293). *Chitraka* is especially recommended for stomachache. It reduces swelling and is recommended for post delivery pain (297). *Yavani* also removes pain and sets right *vata* disorders (Dra. 396). Liquor is a pain reliever (AH. Su. 5-68).

Dropsy/Pain (*Kaphaja Shotha*)

V 42 – Treatment:

Oral administration of the mixture of *brahmi* and sesame oil.

Edema during pregnancy of a mare leading to acute pain can be treated with this mixture.

Brahmi removes swelling and pain (3). Sesame too acts as a pain reliever (100).

Worm infestation (*Krimivridhhi*)

V 43 – Treatment 1:

Oral administration of a mixture of field bean (?) and ghee.

Ghee is an antidote of poison and is the destroyer of all types of bacteria, germs, insects, and worms. Hence it is called '*rakshoghna*' (killer par excellence) (669).

V 43 – Treatment 2:

Oral administration of ground paste of *paribhadra* and sesame oil or ghee.

Paribhadra is a pain reliever and kills germs (84). Properties of sesame and ghee are mentioned earlier.

Diarrhea

V 44 – Treatment:

The procedure of the medicinal preparation is stated vaguely. Hence, we suggest that the ground paste of *kutaja* and *yashtimadhu* is boiled well in milk and set to curdle while hot so as to obtain the pellucid water (*mastu*) on the top. The powders of *atis* and *shunthi* are then mixed with that water for oral administration.

Kutaja is a well known remedy for diarrhea (375). *Yashtimadhu* is a mild purgative and sets right the function of *apana vayu* (which possesses power of expulsion with a downward motion) (207). Pellucid water is very helpful in curing diarrhea and dysentery (665). *Atis* stimulates digestive fire and hastens digestion of undigested food. It is an antidote for fever and diarrhea (293). *Shunthi* cures piles and is a good remedy for digestion (263).

Retention of urine, bloody urine (*Mutravarodha, Raktamutrata*)

V 45 – Treatment 1:

Oral administration of the juice of jujube-fruit-pulp.

Jujube is diuretic (272).

V 45 – Treatment 2:

Oral administration of juice of the roots of *bilva*.

Bilva reduces the formation of urine thus relieving tension of the bladder (180).

V 45 – Treatment 3:

Add juice of *vasaka* leaves, *godugdha*, and *sharkara* for oral administration to cure bloody urine.

Vasaka stops bleeding (199). Being cool, *bilva* can stop bleeding and being nutritious it can counter the weakness resulting from bleeding (Cha. Su. 27-241). Relevant properties of *sharkara* could not be traced but it could be an enhancer of the effects of the other medicines.

Fever (*Jvara*)

V 46 – Symptoms:

The symptoms are of the vitiation of all the three humors, *vata*, *pitta*, and *kapha*.

Erect down, non-grazing, and panting are symptoms of excess *vata*. Foul smell, excessive thirst, and panting are the symptoms of vitiated bile. Physical torpidity, sleepiness, and non-grazing are the symptoms of vitiated phlegm (Cha. Ni. I-21, 24, and 27).

V 47 – Treatment 1:

Prepare a decoction (one third) of powders of *musta* roots, *pippali*, *devadaru*, *khadira*, *nimba*, *chitraka* roots, bark of *saptaparna*, bark of *jambu*, roots of *ashvagandha*, whole plant of *bhunimba*, seeds of *danti*, roots of *katuka(i)*, and whole plant of *guduchi* and add honey and administer orally.

Musta controls thirst and is a known remedy for fever (304). *Pippali* too cures fever (222). *Devadaru* induces sweating and reduces fever (67). *Khadira* pacifies vitiated bile, digests undigested food, and is antipyretic (131). *Nimba* digests undigested chyle and cures fever (122). *Chitraka* cures rigidity of liver and spleen and is an antidote for fever (297). *Saptaparna* is remedy for fever (535). *Jambu* improves digestion and stimulates liver function (510). Direct relevance of *ashvagandha* to the treatment of fever could not be traced. But being a well-known tonic, it can alleviate weakness caused by fever (595). *Bhunimba* controls burning sensation and is a well-known remedy for fever (526). *Danti* cures fever and acts as a purgative (358). *Katuka* also cures burning sensation and fever (349). *Guduchi* is a most popular and well-known remedy for fever (593). Honey sets right the vitiation of all the three humors, besides being *yogavahi* (enhances effectiveness of medicines with which it is combined) (710).

V 48 – Treatment 2:

Feeding the horse with *krishara* (cooked mixture of *mudga* and *vrihi*) to which *nimba*, *patola*, *madhu*, and *pippali* are added.

This feeding removes weakness caused by non-grazing. *Mudga* cures vitiation of bile and phlegm. It is the best diet for a patient (Cha. Su. 27-23). *Vrihi* is a supporting strength-giving diet (Cha. Su. 27-15). *Patola* is a remedy for bile-related fever and chronic fever (529). Properties of *nimba*, *madhu*, and *pippali* are mentioned earlier.

Rheumatism and fatigue (Amavata and Klama)

Rheumatism becomes severe particularly in winter and horses that keep standing all along, are likely to be more susceptible to it.

V 49 – Treatment:

Oral administration of a mixture of powder of *haritaki* and *saindhava*.

Haritaki removes swelling and pain. Given in a liquid form it can be effective for every tissue (587). *Saindhava* cleanses canals and causes sweating which can remove impurities of undigested food (755).

Various diseases

V 49 – Treatment 1:

Mixture of *haritaki* and *saindhava* as per given proportion to be administered at regular intervals to the horse. In summer, jaggery is to be added to the mixture.

Haritaki is also known as ‘*sarvarogahara*’ which means that it can cure all types of diseases. It constitutes five tastes excepting saltiness. In combination with salt it becomes complete with the six tastes and can cure all types of diseases. Used along with jaggery, it is stated to be the best medicine for all types of diseases.¹⁴

V 50 – Treatment 2:

Decoction of the following: roots of *rasna*, leaves of *vasaka*, *shatapushpa*, bark of *bilva*, fruits of wild Himalayan cherry (?), *shunthi*, rhizomes of *musta*, roots of *nikumbha*, roots of *durlabha*, *vidanga*, roots of *agnimantha*, roots of *eranda*, roots of *gokshura*, and roots of *kantakari*.

All types of diseases caused by the imbalance of the three *doshas*, whether by increase or attenuation, can be cured with the combination of these medicines (Bha. 79, Vasa 199, 328, 180, 263, 304, Bha. 399, 250, 402, 182, 52, 490, 225).

V 51 – Symptoms:

This verse specifies symptoms of the various diseases occurring among horses which can be cured with the medicines stated above.

Swelling (*Shotha*)

V 52 – Treatment 1:

Application of the warm gruel paste of the following ingredients: Indian rosebay roots (?), whole plant of *kokilaksha*, roots of *shigru*, roots of *tulasi*, roots of *nikumbha* (*laghudanti*), rhizomes of *suran*, *shunthi*, *yuthika/jati* (?), *panchalavana* (five salts) *arka*, *krishna sarshapa*, *haridra*, and stems of *daruharidra*.

Sanskrit parallel for Indian rosebay could not be traced. *Kokilaksha* coagulates blood and removes swelling (481) while *shigru* removes edema (93). *Tulasi* heals chronic wounds, removes edema, and reduces pain (542). *Nikumbha* cures edema (Bha. 399). *Suran* is a remedy for swelling of joints and pain, and cures elephantiasis and fibroid (435). *Shunthi* purifies blood and removes swelling (63). *Jati* purifies blood but direct relevance to edema could not be traced. Of the five salts, only *saindhava* removes swelling (755). *Arka* removes swelling and pain (353). *Krishna sarshapa* does not have direct relevance to edema (124). *Haridra* removes swelling (133). *Daruharidra* removes swelling and pain (413).

V 52 – Treatment 2:

Application of natron (*yavakshara*?) and *goghrita*.

Yavakshara cures swelling particularly caused by diabetes (760) while *goghrita* cures swelling caused by fever resulting from the imbalance of the three *doshas* (669).

Itching (*Kandu or dadru*)

V 53 – Treatment 1:

Application of the mixture of ash of burned milk-bush (*dugdhika*?; *Euphorbia microphylla*?) and *goghrita*.

Milk-bush (and not *kshirini*) is recommended for skin diseases and is applied on the bite of poisonous insects. Being a remedy for leprosy, it can cure itching (356). *Goghrita* being lubricating can remove disorder of *vata* and through it, itching. It also cures toxicity which too, can cause itching (669).

V 53 – Treatment 2:

Apply burned ash of leaves of *sarja* (white *damar*) and sesame oil.

Sarja destroys germs and stops formation of pus, which is useful in the treatment of boils and abscess. Application of *sarja* is very effective in itching (37). Sesame is a cure for all types of skin diseases (100).

V 54 – Treatment 3:

Application of the paste of the following: *lavana*, *naga* (lead), *haridra*, *yavakshara* (natron), and *saindhava* or *kumari* or roots of *nili*.

Lavana enhances skin disease as its properties are antagonistic to the medicines with which it is combined here. Its recommendation here could be to act as a vehicle for other medicines more speedily. It cleanses ducts and can indirectly help in removing skin disorders and itching (753). *Naga* cures skin diseases (728). *Haridra* is an antidote for itching (133). *Yavakshara* is also useful in curing itching (760). *Saindhava* cures itching (755). *Kumari* cures all types of skin disorders (367). *Nili* acts favorably on the skin and cures leprosy (105).

Abscess (*Vidradhi*)

V 55 – Treatment:

Application of the ointment of the following ingredients: orpiment (*shankhavisha*?), *churnaka*, seeds of *karnikara*, *gandhaka*, *daruharidra*, *naga*, *panchalavana*, *shunthi*, *pippali*, *maricha*, *haridra*, *yavakshara*, *ajadugdha*, and sesame oil.

Orpiment kills germs (722). *Churnaka* scrapes out accumulated impurities in the abscess, acts as an antidote for poison, kills bacteria, and cures abscess (749). *Karnikara* cleanses ducts, retains blood color, and cures edema, excessive phlegm, and wounds (Bha. 499). *Gandhaka* kills germs and scrapes out accumulated impurities from the abscess (720). *Daruharidra* cures swelling, cleanses and heals wounds and acts as a pain-killer (413). *Naga* cures all types of skin disorders (728). *Panchalavana* is used to cure abscess (753–755). *Shunthi* removes pain and swelling (263). *Pippali* and *maricha* are remedies for acute pain and kill germs (222, 229). *Haridra* cleanses and heals wound and wrings out impurities (133).

Yavakshara cures abscess (760). *Ajadugdha* purifies blood affected by excess of bile (Cha. Su. 27-222). Sesame oil pacifies pain and heals wounds, and acts as a lubricator (100).

Abscess of the hoof (*Shapha vidradhi*)

V 56 – Treatment:

Application of ointment made with *shankhavisha*, *guda*, *sala*, *naga*, *laksha*, *maricha*, and sesame oil.

Shankhavisha kills germs, removes edema, and cures fibroids and glands (722). No relevant properties of *guda* (jaggery) could be traced in the texts but there is a practice of applying *churnaka* and jaggery to the abscess. *Sala* kills germs, removes pus, and reduces pain caused by injury (35). *Naga* cures all types of skin disorders, unripe abscess, and fibroids of flesh and wounds inside the bone (728/29). *Laksha* obstructs bleeding and is useful in joining broken bones (708). *Maricha* ripens abscess and helps drive out the impurities (299). Being oily, sesame pacifies excess of *vata* and through it pacifies pain (100).

Elephants' diseases and treatment (*Hastichikitsa*) (Chapter IX)

Acute pain, disorders of spleen, worm infestation, sluggishness, cough, weakened digestive power, lack of appetite, etc.

V 57, 58 – Treatment:

Oral administration of the mixture in equal proportion of the powder of the following ingredients mixed in gruel: *maricha*, *yava*, *pippali*, *vidanga* seeds, roots of *katuka*, roots of *chitraka*, roots of *shigru*, *ghritadipakajjala*, roots of *rasna*, roots of *kushtha*, *vacha*, *karanja* (Indian beech tree; *Pongamia glabra*) (Dra. 120), *panchalavana* (five salts), *yavani*, *ajamoda*, roots of *saptaparni*, leaves of *nimba*, *hingu*, roots of *ativisha*, roots of *chichinda*, *krishna sarshapa*, *jiraka*, *shunthi*, *vi(bi)bhutaki*, *amalaki*, bark of *jambu* tree, *haritaki*, seeds of *latakaranja*, and *sarjikshara*.

Maricha is sharp, enhances digestive power, digests previously undigested food, and enhances virility; it is best among all the medicines in removing all types of cough (299). *Yava* pacifies vitiated *kapha*, acts as a tonic and solidifies muscles, and enhances bulk of feces (Cha. Su. 27-19). *Pippali* is useful as an appetizer, stimulates taste buds, reduces enlargement of liver and spleen, and strengthens the heart (222). *Vidanga* is an efficient killer of germs, pacifies vitiated *kapha* and *vata*, and strengthens nervous system and intellectual power (402). *Katuka* is a purgative, and expels excessive *kapha* and *pitta*. It is a remedy for excessive urination (349). *Chitraka* pacifies vitiated *kapha* and *vata*, enhances digestive power, digests undigested food, expels excessive bile, and cures swelling of anus (279). *Shigru* pacifies

vitiated *kapha* and *vata*, improves digestive system, stimulates taste buds, fortifies heart, removes edema, reduces excessive fat, and is an antidote for poison (93). *Ghritudipakajjala* could not be traced but it is possible to reasonably guess that carbon is stated to absorb gas formation in the stomach. Here, the carbon formed from the lamp burned with ghee can have an additional property of lubrication which can soften intestines and improve digestive system. *Rasna* cures eighty types of *vata* disorders. It also pacifies excessive *kapha* (Bhava. 79). *Kushtha* pacifies vitiated *vata* and *kapha*, improves digestion, cures stomach disorders especially diarrhea, and removes sluggishness (485). *Vacha* pacifies vitiated *vata* and *kapha*, enhances mitigated bile, and cures bloating of stomach and acute stomachache. It also cures piles and kills worms (21). The properties of *karanja* are relevant here. It is a strong purgative, kills worms, stimulates liver function, sets right the function of *apana*, *samana*, and *udana* types of *vata*, and removes fibroid (120). *Panchalavana* stimulate taste buds, improve digestion, and have moistening property (755-57). *Yavani* and *ajamoda* stimulate the appetite, improve digestion, set right the function of *apana vata*, remove pain, and kill worms (396, 398). *Saptaparni* cures disorders of all the three *doshas*, removes acute pain, cures fibroid, cures dysentery, and cures debility resulting from fever (535). *Nimba* pacifies vitiated *kapha* and *pitta*, stimulates taste buds, enhances strength, and cures diarrhea (122). *Hingu* subsides pain, reduces excessive *vata*, reinstates vitality and sets right the function of *apana vayu* (28). *Ativisha* cures many disorders caused by vitiation of the three *doshas*, helps in digestion, and controls vomiting (293). *Chichinda* pacifies vitiated *vata*, kindles taste buds, improves digestion, kills worms, and acts as purgative (534). *Krishna sarshapa* pacifies *kapha* and *vata*, enhances digestive power, and kills worms (124). *Jiraka* scrapes out impurities, kindles taste buds, improves digestion, sets right the function of *vata*, mitigates acute pain, and enhances strength (301). *Shunthi* improves appetite and digestion (263). *Vi(bi)bhutaki* cures vomiting, diarrhea, dysentery, excessive thirst, and bloating of stomach (197). *Amalaki* improves appetite, enhances digestive power, pacifies vitiated *pitta*, and acts as an elixir for life (591). *Jambu* stimulates digestive system and liver function (510). *Haritaki* improves appetite and digestion, enhances strength, acts as a brain tonic, and controls dysentery (587). *Latakaranja* corrects disorders of digestive system and cures debility resulting from fever (539). *Sarjikshara* improves appetite and digestion and kills worms (761).

The diseases stated above are mostly related to digestive disorders. A common treatment for all is therefore, recommended.

Treatment of snakebite (*Sarpadamshachikitsa*) (Chapter X)

Preliminary methods

V 12:

1. Apply earwax to the eyes of the victim.

Use of earwax is authenticated by Ayurveda texts; however it is to be applied to the site of the bite and not to the eyes.¹⁵

2. Tie with bandage for stopping circulation so as to obstruct the spreading of the venom. This is also recommended in Ayurveda.¹⁶

The entire process of this preliminary method is described in detail in Ayurveda (AH. U Tantra, Chapter 36).

V 13:

Burn the site with a hot rod.

This too, is recommended in Ayurveda (Ibid. 45, 46).

Drugs

V 15:

Administration of an excellent medicine . . .

Except salt none of the drugs recommended here are directly antitoxic. Salt too, induces vomiting and is not directly relevant to snakebite.

V 16:

Administer the mixture of juices of *indravaruni*, *patalagaruda*, *kitamari*, and *aparajita*, added to the juice of the pulp of *katutumbi*.

Indravaruni is antitoxic and the oil from the seed is recommended particularly for countering venom (347). *Patalagaruda* is antitoxic, cures imbalances of all the three *doshas*, and enhances strength; the juice of its roots is orally administered to the victim of snakebite (605). *Kitamari*, kills germs and worms and is an extractor of poison (412). Ground paste of the bark of the root of *aparajita* and that of *nirgundi* is administered orally to the patient (Cha. Chi. 30, Bha. 342). *Katutumbi* is also an antidote for poison. It induces vomiting (313).

V 17:

This describes the preventive aspect of snakebite.

Many of the materials prescribed here are anti-venom but that they can be used as preventives giving immunity against snakebite is not authenticated in the texts of Ayurveda. Perhaps the author has included this as a community practice.

Mantras and preventive methods

V 18–20:

These verses also describe preventive medicines many of which are antitoxic but the method and time of administering them, etc. are based on astrology and superstitions.

Treatment especially for venom of chain viper

V 21 – Treatment 1:

Ghee medicated with *mayurashikha*, flowers and seeds of *karanja*, *madhu*, a kind of *mahanimba*, and *sarshapa*.

Ghee is the best antitoxin¹⁷ (Cha. Su. 27-231). Relevant properties of *mayurashikha* could not be traced (390). Seeds of *karanja* are used as remedy for fish-venom (120). Relevant properties of *madhu* could not be traced. Perhaps it is suggested as *yogavahi* (enhancing the properties of other medicines with which it is combined) (710). *Mahanimba* is recommended against rat-venom (432). Directly relevant properties of *sarshapa* could not be traced (107).

V 21 – Treatment 2:

Ghee medicated with *vacha* and *karavella*.

As mentioned earlier, ghee is the best antitoxin. *Vacha* prevents unconsciousness and stimulates heartbeats (21). *Karavella* is antitoxic (531).

Treatment especially for cobra bite

V 22 – Treatment 1:

Administer paste of *vanaharidra* bulbs ground in cow dung juice.

Vanaharidra acts as an antiseptic (135). Cow dung prevents unconsciousness and is antitoxic.

V 22 – Treatment 2:

Administer orally *goghrita* and sesame oil.

Properties of *goghrita* are discussed earlier. Sesame is used as *yogavahi* (enhancing properties of ghee).

Treatment for venom of miscellaneous serpents

V23:

Gruel mixed with *maricha*, *pippali*, roots of *patala*, roots of *karavira*, and roots and flowers of *arka* to be orally administered.

Gruel removes exhaustion and sluggishness (AH. Su 5-79). *Maricha* is antidote for venom when combined with *arka* (299). *Pippali*, *patala*, and *karavira* do not have properties directly connected with snakebite (222, 186, 537). *Arka* itself is a poison. This is technically called poison as against venom. There is a concept in Ayurveda that poison and venom are mutual antidotes. The poisonous juice of *arka* roots is an antidote for snake venom in

combination with *maricha*. The latter acts as *yogavahi* (enhancer) or can help in opening blood vessels facilitating *arka* juice to extract the venom.

Concluding remarks

Indian tradition of theory and practice of veterinary science could not continue later due to various factors. As is the case with every other branch of learning, traditional education was interrupted by continuous foreign invasions. Universities like Nalanda and Takshashila known all over the world for their high standard of learning were burned, looted, and destroyed. Attempts of educating in the traditional manner small groups of worthy students still continued in different pockets for some time. The educational system later established by Lord Macaulay (1800–1860) had a declared purpose of producing matriculates and graduates with reasonably good knowledge of English to help the smooth functioning of the British administration. To achieve this purpose it was necessary to wean the intellectual class, predominantly the Brahmins, from the traditional Sanskrit education and to attract them towards English and Western knowledge. With no takers for the traditional knowledge, the natural growth and development of the sciences were stunted. Modern Indian scientists learned the respective subjects from the Western scholars and from the books written by them and were cut off from the traditional wisdom on the subject, handed down by ancient Indian scholars in a reasonably systematic form. The tendency to ignore the ancient Sanskrit texts on the present and other subjects and to look to the West for every field of knowledge was systematically nurtured by the educational system introduced all over the country by the British.

It is stated above that the knowledge of the science of animal diseases could not continue to grow here, due to many social and political circumstances. There was, however, a very large class of people here, who were cut off from the knowledge of Sanskrit and yet remained outside these circumstances and Western influences and continued to diagnose and treat diseases of their animals according to the traditional knowledge and as much was passed on to them by generations. Thus three different currents exist in this branch of knowledge in India.

1. That which is directly based on Ayurveda which is preserved by earlier Sanskrit works like those of Palakapya Shalihotra, and in works like Puranas and epics.
2. That which is based on Ayurvedic principles but is modified by local practices as in works of the medieval times like Manasollasa, Lokopakara, etc.
3. That which has a very remote connection with the *shastra* and which continues to exist even today mainly in the form of local practices current among various ethnic groups in the remote regions of the country.

Of late several studies have been undertaken by modern scientists and scholars to collect data on these ethno-veterinary practices followed by aboriginal tribes, villagers, farmers, women and so on, occupying various interior regions of India. Many of them have appeared

as articles in the various issues of the journal Asian Agri-History. A similar study from the view point of Ayurveda too is desirable. It is very likely that a systematic and consolidated study of the unbiased ethno-veterinary practices, unaffected by the interruption caused by modern education may reveal that they too are still quite closely related to the Ayurvedic base. Generally no convention, folklore, and social or religious practice in vogue in the Indian society is found without a link with and support of *shastras* handed down by tradition. The links might have become obscure in course of time. Local element might have superceded the traditional inheritance in some cases. Lack of education could have widened the gap between the science and the common man. But connection may still be found between the two.

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End notes

1. A: Wild boar knew the medicinal herb. Mongoose knew it. Snakes and Gandharvas knew it too. The same I invoke for healing our ailment.
वराहो वेद वीरुद्धं नकुलो वेद भेषजीम् । सर्पा गन्धर्वा यां विदुस्ता अस्मा अवसे हुवे । । 23 । ।
B: Birds and swans knew about it. All birds have its knowledge. Even the wild animals know it. I invite that herb to save us.
... व्यांसि हंसा या विदुर्याश्च सर्वे पतन्त्रिः । मृगा या विदुरोषधीस्ता अस्मा अवसे हुवे । । 24 । ।
C: May all those medicinal herbs which the healthy cows invariably eat when unwell and which the goats and sheep too, eat, save you acting as nectar and give you relief.
यावतीनामोषधीनां गावः प्राश्नन्त्यच्छन्या यावतीनामजावयः । तावतीस्तुप्यमोषधीः शर्म यच्छन्त्वमृताः । । 25
2. Rgveda I-118-8.
3. Ibid I-116-15.
4. Mahabharata, Virata. 3-7; 12-8.
5. Tiwari/Dubey, 2000.
6. Ibid.
7. Charaka Chi. 30.
8. एवमेव क्षीरसर्पिंजीवनीयोपसाधितम् । गर्भदं पित्तलानां— । । Charaka Chi. 4-69, 70.
9. पाके लघ्वाविकं सर्पिर्नं च पित्तप्रकोपणम् । कफेऽनिले योनिदोषे शोषे कम्पे च तदिदतम् । । Sushruta Su. 45-101.
10. Veerana.
11. पित्तलानां तु योनीनां सेकाम्यङ्गपिचुक्रियाः । शीताः पित्तहराः कार्याः स्नेहनार्थं घृतानि च । । Charaka Chi. 4-63.
12. वयोऽहरात्रिभुक्तानां तेऽन्त्यमध्यादिगाः क्रमात् ।
13. ज्वरादौ लङ्घनं प्रोक्तं ज्वरमध्ये तु पाचनम् । ज्वरान्ते भेषजं दद्यात् ज्वरमुक्तेविरचनम् । ।
14. लवणेन कफं हन्ति पित्तं हन्ति सशर्करा । घृतेन वातजान् रोगान् सर्वरोगान् गुडान्विता । । (Bhava. p. 6, v 33).
15. निष्ठीवेन समालिप्तेदृशं कर्णमलेन वा । AH. U. Tantra 36-41.
16. दंशस्योपरि वृष्णीयादरिष्टां चतुरङ्गुले ।
क्षौमादिभिर्वैणक्रियासिद्धैर्मन्त्रैश्च मन्त्रवित् । । Ibid. 42.
17. सर्वेषु मर्वावस्थेषु विषेषु न घृतोपमम् ।
विद्यते भेषजं किञ्चिद्विशेषात्प्रबलेऽनिले । । AH. U. 35- 69/70.

Commentary

Umashashi Bhalerao¹

I read with great interest the English translation of the original text entitled *Lokopakara*, written in old Kannada language by the famous poet Chavundaraya in 1025 AD and the introduction written by Shri Valmiki Sreenivasa Ayangarya.

The original text contains twelve chapters dealing with various subjects useful to the common man. The contents are not new or original but are based on old Sanskrit texts. Chavundaraya must have compiled the information which he thought would benefit the common man and then translated this into the then spoken old Kannada language. His efforts are really commendable since he has tried to pass on this important and useful information to the common people, who did not understand Sanskrit. The very name of the text is significant. *Lokopakara* means for the benefit of people. Subjects covered by him include a full chapter (57 verses) on *Supa shastra*, the art and science of cookery.

Since I am myself a Kannadiga, I am familiar with the food culture of Karnataka in southern India; therefore, this chapter on the art and science of cookery impressed me a lot. The first thing that struck me is that non-vegetarian food is not mentioned in this text. Kannadigas are basically vegetarians and Chavundaraya was a Jain poet.

In the very first sentence of this chapter, Chavundaraya emphasizes what our ancestors had said: "Food is life". Hence food being the most essential item in man's life, he writes about the art and science of cookery for people's welfare. To begin with, he tells us about the most simple thing; that is how to cook rice properly. Raw rice has to be cleaned, washed three times in clean water, and then cooked in boiling water. It is to be noted that a lot of importance was given to cleanliness. When the rice is cooked, excess water has to be removed. Before the invention of pressure cooker, I have seen rice being cooked in the manner described by Chavundaraya. In any case, in India we have always lived in joint families and a large quantity of rice had to be cooked. Even today, large quantity of rice is cooked in the same old traditional method. It is interesting to read that to preserve 'cooked rice' for a longer period, a decoction of sacred basil (*tulsi*) leaves was used (see Plant Index in this volume). Even now, after offering the food to God, we always keep a few *tulsi* leaves on the cooked rice. This religious custom must have been practiced in ancient times with the scientific reason of preserving food.

Rice was the main food in the 10th century AD in Karnataka. It is mentioned that rice was eaten with curd, *huli* (or *sambhar*) *kutu*, or vegetables. In this one chapter, Chavundaraya has mentioned 31 vegetables and 12 spices to give different flavors to vegetables and pulses. Tamarind and lime juice was also commonly used.

1. Shatrunjay Apartments, 33, Sanewadi, Aundh, Pune 411 007, Maharashtra, India.

For making *sambhar*, *huli*, or *kutu*, it is mentioned to grind cardamom, cumin, mustard, black pepper, cinnamon, and coriander seeds in water and then add this gruel to any cooked pulse along with salt and tamarind. In Karnataka this is a very common method of making *masala* even today, though with a slight variation. Different ways of preparing *palya* (leafy vegetables) are mentioned in this text. Apart from using a variety of normal vegetables, leaves, roots, sprouts, and shoots were also used for preparing *palya*. It is mentioned that certain leaves, roots, sprouts, and shoots (pipal shoots, tamarind shoots, castor shoots, etc.) should be soaked in lime juice or buttermilk, before cooking, to remove their unpleasant bitter taste. It is amazing to know that a thousand years ago, our ancestors knew about detoxification of certain seeds and roots before using them in cooking, and that they also knew the methods of debittering certain vegetables. Many herbal products to remove bitterness from different vegetables are elaborately described in this chapter. Even today we use the same method of applying salt, turmeric powder, and lime juice to debitter *karela* (bitter gourd). To remove the itchiness of certain vegetables, they are to be soaked in rice pap for some time and then boiled with tamarind water. We also make use of tamarind to remove the itchiness. It is fascinating to know how this information was passed on from one generation to the next generation and is useful and practiced even today.

In certain recipes Chavundaraya has mentioned *oggarane*. *Oggarane* (*tadka* or *baghar* in Hindi and *phodni* in Marathi) is an essential and integral part in the preparations of all vegetable dishes and pulses. In boiling oil or ghee, mustard seeds, cumin seeds, asafetida powder, and turmeric powder are added. Sometimes other spices like chilies, curry leaves, blackgram, etc. are also added. Vegetables are fried and cooked in this *oggarane*. *Oggarane* is also added to cooked pulses while preparing *huli* or *sambhar*. Even now in Karnataka, no savory food item is complete without *oggarane*.

Another point to be noted is that in none of the recipes there is any mention of onion or garlic. In olden days, strict vegetarians, especially the Brahmins, never ate onion or garlic. I remember my mother (born, brought up, and married in a very orthodox Brahmin family) telling me how she never even knew the taste of onion until she was 30 years old.

It seems that in those days *idlis* (dumplings) were made by grinding only the split blackgram dhal and adding clear surface water from the curd, asafetida, cumin seeds, coriander, and black pepper, and then shaping. Three elements of the modern *idli* are missing in this recipe. There is no mention of adding rice grits to the blackgram (in the proportion of two parts to one of blackgram), keeping the mixture overnight for fermentation, and that *idlis* are to be steamed. These elements must have been added in later centuries.

The recipe of making *laddus* from dried and roasted barley powder and adding ghee, sugar syrup, cardamom powder, and saffron, is similar to *rava laddus* ('*rave unde*' in Kannada). Method to prepare sugar syrup (*paka*) for *laddus* is correctly given.

Milk balls were prepared from congealed milk, by adding powdered roots of Indian abutilon or country-mallow to boiling milk; and then adding ghee, sugar, cardamom, and cinnamon to this milk. Chavundaraya tells us that these milk balls tasted like ambrosia. They also knew

how to make soft cheese from buffalo milk by adding roots of amarnath plant or the leaves of *kokilaksha* to the milk.

Names of many food items mentioned in this chapter are the same even today. For example *savige*, *mandige*, and *sandige*.

Savige is like vermicelli. Nowadays we can buy machine-made vermicelli or *savige*. But in olden days my mother and aunts used to prepare *savige* at home. It was an elaborate and lengthy process. Ghee and milk were added to wheat and rice flour and then from this dough, long, thin *saviges* were made. Chavundaraya has mentioned that balls or *laddus* were made from this *savige* by using sugar syrup and milk as adhesives. I have not seen such *laddus*. We use *savige* mostly to prepare *payasam (kheer)*.

Mandige today in Karnataka is a very large thin *paratha* stuffed with finely ground sugar containing cardamom powder and baked on an upturned clay pot. Chavundaraya has not given the recipe for making *mandige* but he has written that *mandige* should be soaked in a mixture of hot milk and ghee. Then saffron, cinnamon, cardamom, sugar, and water of tender coconut should be added. This mixture is to be kept in a sealed urn and this sealed urn (seal was made of wheat dough called *kanika* in Kannada) is to be kept in the midst of fire. Later this cooked sweet mixture was removed from the urn and served. Probably in those days *mandige* meant cooked flour of wheat or rice.

Sandige is a household preparation in Karnataka. It is prepared from grains, pulse flour, and ash gourd. Spices like sesame, asafetida powder, salt, and chili powder are added to this and small balls of this mixture are made and then dried in hot sun. They are fried in oil before serving. *Sandige* is normally prepared in summer and stored for later use. Chavundaraya, however, gives a slightly different recipe. "Soak the leaves of coffee senna in rice pap for three days. Take out its clear water and grind barley, sesame, and blackgram. Then add powder of asafetida and turmeric and prepare *sandiges* and dry them in the sun. Later they can be fried in oil." Though slightly different, the basic idea of *sandige* is the same.

Many methods of preparing good curd (yoghurt) are explained. Add powder of *apamarga* or the roots of *mahabala* or pure gingelly oil or flowers of *karnikara* to hot milk to make curd. Butter extracted from this curd will give good quality of ghee. It is also mentioned that the pulp of wood-apple should be squeezed by hand in thick curd 21 times. Then this pulp should be strained and dried in shade. Its powder can be stored for daily use as curd powder. One must marvel the way the culture of the curd-inducing inoculum was preserved. Today we do not need these elaborate methods for preparing daily curd. But it is to be noted that our ancestors had scientifically developed different methods for preparing good curd. They also knew how to prepare flavored curd. One recipe in this text says, "Smear the inside wall of a clean pot with mango juice. Add hot milk to this urn. The milk gets converted into curd, which will have the fragrance of mango." Similarly different fruit pulps can be used to give different flavors to the curd.

Chavundaraya has given elaborate directions for extracting the juice from each of the several fruits by adding jaggery (from cane sugar) to them and then exposing to the sun. He tells that

pellets of mango and unripened fruits can be preserved in ghee. Ripened fruits of mango can be preserved for many days retaining its color and taste when preserved in liquid jaggery and honey. It would be appropriate to recall that Babur, the Mogul, was waiting for an auspicious omen to invade India. He took the final decision in 1526, the day he received a gift of mangoes preserved in honey from Daulat Khan Lodhi. Today we use sugar syrup instead of jaggery to preserve fruits. Ripe fruits were mashed and made into *seekarne*. Since childhood, I have been eating banana *seekarne* and mango *seekarne*. *Sikharini* was also made by adding jaggery, nutmeg powder, etc. to curd.

Many names of the food items given in this text written a thousand years ago are the same words used in the modern Kannada language. We use the words *anna*, *huli*, *palya*, *oggarane*, *seekarne*, *unde*, *savige*, *mandige*, and *sandige* almost everyday. The recipes of these preparations may vary a little today but the basics are the same. This text written by Chavundaraya gives an insight into the continuous experimentation with different herbs, spices, and other ingredients by our ancestors to prepare different food items, and different methods to preserve them for a long period.

I thank Dr Y L Nene, Chairman of the Asian Agri-History Foundation, for giving me the opportunity to study this chapter on *Supa shastra* and offer my comments.

Plant Index

A list of plant names – I

Latin	English	Sanskrit	Verse
<i>Abrus precatorius</i> L.	Jecquirity seeds	<i>Gunja</i>	VII/45; VIII/25, 31; IX/4, 13
<i>Abutilon indicum</i> (L.) Sweet	Indian abutilon	<i>Atibala</i>	VIII/10
<i>Acacia catechu</i> (L.f.) Willd.	Catechu	<i>Khadira</i>	VII/4, 9–10, 62; IX/47
<i>Acacia pennata</i> (L.) Willd.	<i>Biswal</i> (Hindi)	<i>Khadiravallari</i>	VIII/27
<i>Achyranthes aspera</i> L.	Prickly chaff flower plant	<i>Apamarga</i>	VIII/43; IX/6, 28
<i>Aconitum heterophyllum</i> Wall. ex Royale	<i>Atis</i> (Hindi)	<i>Ativisha</i>	VI/11; IX/41, 44, 57
<i>Acorus calamus</i> L.	Sweet flag	<i>Vacha</i>	VII/11, 45; VII/3; IX/8, 16, 40, 57; X/21; XI/29
<i>Adhatoda vasica</i> Nees	Malabar nut	<i>Vasaka</i>	IX/32, 37, 38, 45, 50
<i>Adiantum capillus-veneris</i> L.	Maidenhair fern	<i>Hansapadi</i>	VII/52
<i>Aegle marmelos</i> (L.) Corr.	Bael, Bengal quince	<i>Bilva</i>	V/19, 27; VI/38, 44; VII/11, 25, 26, 36, 41, 50, 52, 58, 63, 70; VIII/20; IX/15, 37, 45, 50
<i>Alangium salviifolium</i> (L.f.) Wang.	Sage-leaved alangium	<i>Ankola, ankota</i>	V/27; VI/19, 25, 30, 54, 57
<i>Albizia lebbeck</i> (L.) Benth.	Lebbeck-tree, siris	<i>Sirisah, bhandi</i>	V/27, 29; VII/3; VIII/27; IX/37
<i>Albizia odoratissima</i> (L.f.) Benth.	Black siris	<i>Sirisah, bhandi</i>	X/19
<i>Alhagi pseudalaghagi</i> (Bieb.) Desv.	Camel thorn	<i>Durlabha</i>	IX/41, 50
<i>Allium cepa</i> L.	Onion	<i>Palandu</i>	VIII/27
<i>Allium sativum</i> L.	Garlic	<i>Rasonah, lasuhna</i>	VII/68, 70; VIII/27; IX/16; XI/29
<i>Aloe barbadensis</i> Mill.	Barbados aloe	<i>Kumari</i>	VIII/27; IX/54
<i>Alpinia galanga</i> (L.) Sw.	Greater galangal	<i>Rasna</i>	IX/25, 34, 50, 57
<i>Alstonia scholaris</i> (L.) R.Br.	Dita bark tree	<i>Saptaparnah</i>	IX/37, 47, 57
<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	<i>Gudari saag</i> (Hindi)	<i>Matsyakshi</i>	VIII/19
<i>Amaranthus blitum</i> L. var. <i>oleracea</i> Duthie	Amaranth (for vegetable)	<i>Marisha</i>	V/12; VIII/22; IX/15
<i>Amaranthus cruentus</i> L.	Amaranth (grain)	<i>Rajagiri</i>	VIII/9
<i>Amorphophallus campanulatus</i> (Roxb.) Blume ex Dcne.	Elephant-foot yam	<i>Surana</i>	VIII/27, 28; IX/52
<i>Andrographis paniculata</i> (Burm.f.) Wall. ex Nees	King of bitters	<i>Bhunimbah</i>	IX/47

Latin	English	Sanskrit	Verse
<i>Anethum sowa</i> Kurz	Indian dill	<i>Shatapushpa</i>	VI/14; VII/41; VIII/40; IX/50
<i>Anthocephalus cadamba</i> (Roxb.) Miq.	Kadam	<i>Kadamba</i>	V/33; VII/2
<i>Apium graveolens</i> L. var. <i>dulce</i> (Mill.) DC.	Celery	<i>Ajmoda</i>	IX/57
<i>Aquilaria malaccensis</i> Lamk.	Agar, calambac, eagle wood	<i>Aguru</i>	VI/34, 49; VII/9–10, 18, 26, 30, 35–37, 42, 49, 52, 54, 55, 58, 60, 64; VIII/57
<i>Areca catechu</i> L.	Arecanut	<i>Kramukah, pugah</i>	VI/45; VII/3, 19, 23, 32; IX/8, 28
<i>Aristolochia bracteolata</i> Lamk.	Bracteated birthwort	<i>Kitamari</i>	VIII/29; X/16
<i>Artemisia nilagirica</i> (Clarke) Pamp.	Indian wormwood fleabane	<i>Nagadamani</i>	VII/28
<i>Artocarpus heterophyllus</i> Lamk.	Jack fruit	<i>Panasah</i>	VI/21, 26, 31; VII/56; VIII/35
<i>Artocarpus lakoocha</i> Roxb.	Monkey jack fruit	<i>Lakucha</i>	VII/50
<i>Asparagus racemosus</i> Willd.	<i>Satmuli, satawar</i> (Hindi)	<i>Shatavari</i>	VIII/27
<i>Azadirachta indica</i> A. Juss	Neem tree, margosa	<i>Nimba</i>	V/30; VI/38, 45; VII/68; VIII/25; IX/17, 21, 29, 32, 38, 47, 48, 57
<i>Baliospermum montanum</i> (Willd.) Muell.-Arg.	<i>Dant</i> (Hindi)	<i>Danti</i>	VII/18
<i>Bambusa arundinacea</i> (Retz.) Willd.	Bamboo	<i>Vanshlochan</i>	VIII/50; IX/13
<i>Barleria cristata</i> L.	<i>Tadrelu</i> (Hindi)	<i>Kurabaka, kuranta</i>	VI/50
<i>Basella alba</i> L.	Indian spinach	<i>Potaki</i>	IX/15
<i>Bauhinia variegata</i> L.	Mountain ebony	<i>Kanchanara, kovidara</i>	V/35
<i>Berberis aristata</i> DC.	Indian barberry	<i>Daruharidra</i>	VII/56; IX/34, 52, 55
<i>Betula alnoides</i> Buch.-Ham.	Indian birch	<i>Bhurjah</i>	VII/67
<i>Bignonia crispa</i> Buch.-Ham.	Trumpet flower	<i>Syonakah</i>	VII/2, 18
<i>Bombax ceiba</i> L.	Red silk-cotton	<i>Mocha, salmali</i>	IX/4
<i>Borassus flabellifer</i> L.	Palmyra palm	<i>Tala</i>	V/24, 26
<i>Boswellia serrata</i> Roxb. ex Colebr.	Indian olibanum	<i>Sallaki</i>	VII/13, 29, 31, 32, 44, 58
<i>Brassica alba</i> (L.) Rabenh.	White mustard	<i>Sarshapa, siddhartha</i>	VI/45
<i>Brassica nigra</i> (L.) Koch	Black mustard	<i>Rajika</i>	IV/47; VI/10–12; VIII/16, 55; IX/8, 10, 19, 30, 52, 57; X/21
<i>Breynia retusa</i> (Dennst.) Alston	<i>Bahupushpa</i> (Hindi)	<i>Kamboji</i>	VIII/18
<i>Butea monosperma</i> (Lamk.) Taubert	Flame of the forest	<i>Palasha</i>	V/19, 34, 37, 38; VIII/21
<i>Cadaba fruticosa</i> (L.) Druce	<i>Kodhab</i> (Hindi)	<i>Balaya</i> (?)	IX/8

continued

Latin	English	Sanskrit	Verse
<i>Caesalpinia crista</i> L.	Bonduc nut, molucca bean	<i>Latakaranjah</i>	VII/15, 27, 30, 32, 33, 35, 64; IX/26, 57
<i>Callicarpa macrophylla</i> Vahl	<i>Daya</i> (Hindi)	<i>Priyangu</i>	VI/42
<i>Calophyllum inophyllum</i> L.	Indian laurel	<i>Punnagah</i>	VII/46
<i>Calotropis gigantea</i> Ait.	Madar	<i>Arhak</i>	V/40; VIII/27; IX/10, 13, 25, 26, 28, 30, 32, 52; X/23
<i>Calotropis procera</i> (Willd.) Dryand ex W. Ait.	Akund	<i>Mandara, arka</i>	IX/9
<i>Capparis sepieria</i> L.	Indian caper	<i>Kanthari</i>	IX/24
<i>Capparis zeylanica</i> L.	<i>Gitoran, ardanda</i> (Hindi)	<i>Vyaghranakhi</i>	VIII/30
<i>Carthamus tinctorius</i> L.	Safflower	<i>Kusumbah</i>	VII/62
<i>Cassia occidentalis</i> L.	Coffee senna	<i>Kasamardah</i>	VIII/17, 22
<i>Cedrus deodara</i> (Roxb. ex Lamb.) G. Don	Deodar, Himalayan cedar	<i>Devadaru</i>	VI/45; VII/19, 26, 33, 51, 58; IX/36, 47
<i>Ceiba pentandra</i> (L.) Gaertn.	Silk cotton	<i>Kutasalmali</i>	IX/28
<i>Celosia cristata</i> L.	Cock's comb	<i>Mayurashikha</i>	X/21
<i>Centella asiatica</i> (L.) Urban	Asiatic pennywort	<i>Brahmi</i>	IX/32, 42
<i>Cicer arietinum</i> L.	Chickpea	<i>Chanaka</i>	VI/52; VIII/15, 16, 45
<i>Cinnamomum zeylanicum</i> Blume	Cinnamon	<i>Tvaka</i>	VII/2-4, 16, 18, 19, 27, 28, 32, 44, 45, 51, 64; VIII/5, 7, 10, 14, 53-55, 57
<i>Cissampelos pareira</i> L.	False pareira root	<i>Patha</i>	VII/47
<i>Citrullus colocynthis</i> (L.) Kuntze	Bitter apple, colocynth	<i>Indravaruni</i>	IX/26, 32; X/16
<i>Citrus limon</i> (L.) Burm.f.	Lemon	<i>Jambira</i>	VI/44
<i>Citrus medica</i> L.	Citron	<i>Matulunga</i>	VI/21, 34; VII/8, 11, 53, 55; VIII/3, 34, 53, 56
<i>Citrus sinensis</i> (L.) Osbeck	Sweet orange	<i>Nagaranga</i>	VI/33
<i>Clerodendrum indicum</i> (L.) Kuntze	Tube flower, Turk's turban	<i>Bharangi</i>	V/17; VII/26; IX/38
<i>Clerodendrum phlomidis</i> L.f.	<i>Arani</i> (Hindi)	<i>Agnimantha</i>	IX/50
<i>Clitoria ternatea</i> L.	<i>Gokarni</i> (Hindi)	<i>Aparajita, girikarnika</i>	IX/24, 32; X/16, 17
<i>Coccinea grandis</i> (L.) Voigt	Ivy gourd	<i>Bimbi</i>	VIII/30; IX/14
<i>Cocculus hirsutus</i> (L.) Diels	<i>Jamti ki bel</i> (Hindi)	<i>Patalagarudi, patalagaruda</i>	IX/14, 24; X/16

continued

Latin	English	Sanskrit	Verse
<i>Cocos nucifera</i> L.	Coconut	<i>Narikela</i>	V/26; VI/32; VIII/7, 8, 46
<i>Commiphora wightii</i> (Arnott) Bhandari com.nov.	Indian bdelium tree	<i>Guggulu</i>	VI/12; VII/3, 7, 11, 13, 27, 32, 42, 46, 55, 57, 58, 60; IX/28
<i>Cordia dichotoma</i> var. <i>wallichii</i> (Cl.) Maheshwari	Indian cherry, sebesten	<i>Slesmataka</i>	VIII/27
<i>Coriandrum sativum</i> L.	Coriander	<i>Dhanyaka</i>	VII/4, 44; VIII/11, 41, 55; IX/41
<i>Corypha umbraculifera</i> L.	Fan palm, talipot palm	<i>Alpayushi</i>	VIII/34
<i>Crataeva nurvala</i> Buch.-Ham.	<i>Barna</i> (Hindi)	<i>Varunah</i>	VII/56
<i>Crocus sativus</i> L.	Saffron	<i>Kumkuma, keshara</i>	VII/24; VIII/5, 7, 14, 52
<i>Croton oblongifolius</i> Roxb.	<i>Chuka</i> (Hindi)	<i>Hastidanti</i>	VII/11
<i>Croton tiglium</i> L.	Croton	<i>Dravanti, jayapala</i>	IX/47
<i>Cucumis pseudo-colocephalum</i> Royale	<i>Indrayan</i> (Hindi)	<i>Vishala</i>	VI/11
<i>Cucurbita maxima</i> Duch.	Red gourd, red pumpkin	<i>Gudayogaphala</i>	VI/55
<i>Cuminum cyminum</i> L.	Cumin	<i>Jiraka</i>	VIII/11, 53, 55; IX/7, 57
<i>Curcuma angustifolia</i> Roxb.	East Indian arrowroot	<i>Tavakshir</i>	VII/9-10
<i>Curcuma aromatica</i> Salisb.	Wild turmeric, zedoary	<i>Vanaharidra</i>	VII/23, 28; VIII/54; IX/16, 26, 32; X/22
<i>Curcuma domestica</i> Val.	Turmeric	<i>Haridra</i>	VI/12, 45; VII/14; VIII/17, 22, 26; IX/16, 25, 28, 34, 52, 54, 55
<i>Curcuma zedoaria</i> (Berg.) Rose.	Wild turmeric, zedoary	<i>Karchura</i>	VII/23, 28; VIII/54; IX/16, 26, 32; X/22
<i>Cymbopogon martinii</i> (Roxb.) Wats.	Palma rosa	<i>Rohisa</i>	V/28
<i>Cynodon dactylon</i> (L.) Pers.	Bermuda grass, sacred grass	<i>Durva</i>	V/34; VIII/36; IX/4
<i>Cyperus rotundus</i> L.	Nut grass	<i>Musta</i>	VI/27, 46; VII/4, 5, 32, 35, 38, 43; VIII/57; IX/7, 36, 47, 50
<i>Datura metel</i> L.	<i>Kaladhatu</i> (Hindi)	<i>Dhatura, unmattha</i>	IX/15
<i>Datura stramonium</i> L.	Thorn apple	<i>Dhatura</i>	VII/14; VIII/31, 38; IX/25
<i>Desmostachya bipinnata</i> (L.) Stapf	<i>Dab, darbha, durva</i> (Hindi)	<i>Kusa</i>	V/28, 34
<i>Diospyros peregrina</i> (Gaertn.) Gurke	Indian persimmon	<i>Tinduka</i>	V/37; VII/46; IX/41
<i>Diplonema butyracea</i> (Roxb.) H.J. Lam.	Indian butter-tree	<i>Phulwara</i> (Hindi)	VII/38
<i>Dolichos uniflorus</i> Lam.	Horsegram	<i>Kulattha</i>	IX/17, 33

continued

Latin	English	Sanskrit	Verse
<i>Echinops echinatus</i> Roxb.	<i>Utakanta</i> (Hindi)	<i>Tikshanagra</i>	IX/27
<i>Eclipta prostrata</i> (L.) L.	<i>Bhangra, mochkand</i> (Hindi)	<i>Bhringaraj, markava</i>	IX/28; X/17
<i>Elettaria cardamomum</i> Maton	Cardamom	<i>Ela</i>	VII/2, 4, 5, 19, 21, 23, 27, 28, 43, 51; VIII/5, 7, 10, 55, 57
<i>Embelia ribes</i> Burm.f.	<i>Baberang</i> (Hindi)	<i>Vidanga</i>	VI/6, 11–13, 18, 32; VII/39; IX/32, 36, 50, 57
<i>Emblica fischeri</i> Gamble	Myrobalan emblic	<i>Amalaki</i>	IX/57
<i>Emblica officinalis</i> Gaertn.	Embllic myrobalan,	<i>Dhatri, amalaki</i>	V/17, 27; VI/34, 39; VII/24, 27, 28; VIII/20, 49, 56
<i>Erythrina indica</i> Lamk. var. <i>parcellii</i> Hort.	Indian gooseberry		
<i>Erythrina stricta</i> Roxb.	Indian coral tree	<i>Paribhadrah</i>	IX/43
<i>Euphorbia tirucalli</i> L.	<i>Mura</i> (Hindi)	<i>Mura</i>	VII/26
<i>Fagus sylvatica</i> L.	Indian tree spurge, milk-bush	<i>Vajradruma</i>	VIII/27; IX/53
<i>Ferula assafoetida</i> L.	Indian beech		VIII/23; IX/57; X/21
	Asafetida	<i>Hingu</i>	VII/11; VII/15, 68, 69; VIII/11, 17, 53; IX/16, 32, 41, 57
<i>Ficus benghalensis</i> L.	Banyan	<i>Nyagrodha, vata</i>	V/31; VI/26; VII/56; IX/15
<i>Ficus carica</i> L.	Fig	<i>Anjira</i>	VII/26; VII/56
<i>Ficus glomerata</i> Roxb.	Cluster fig	<i>Udumbara</i>	V/20
<i>Ficus hispida</i> L.f.	Wild fig	<i>Kakodumbara</i>	V/21
<i>Ficus lucescens</i> Blume	<i>Pilkhan</i> (Hindi)	<i>Plaksha</i>	VI/26; VII/56
<i>Ficus religiosa</i> L.	Pipal	<i>Asvattha</i>	VI/26; VII/56; VIII/20
<i>Flacourzia jangomas</i> (Lour.) Raeusch.	Puneala plum	<i>Talisha</i>	X/17
<i>Glycyrrhiza glabra</i> L.	Licorice	<i>Yashtimadhu</i>	VI/37, 40; VII/14; IX/34, 44
<i>Gmelina arborea</i> L.	Malay bush-beech	<i>Gambhari, kashmari</i>	IX/37
<i>Gossypium arboreum</i> L.	Tree cotton	<i>Karpasa</i>	VIII/26; IX/23
<i>Gymnema sylvestre</i> (Retz.) Schult.	<i>Merasingi</i> (Hindi)	<i>Ajashringi, meshashringi</i>	VIII/23
<i>Heliotropium indicum</i> L.	<i>Hatisura</i> (Hindi)	<i>Srihastini</i>	VII/18, 28, 34, 35, 37, 55
<i>Hibiscus rosa-sinensis</i> L.	Shoe-flower	<i>Japa</i>	VI/50; VIII/18
<i>Hiptage benghalensis</i> (L.) Kurz	<i>Madhavilata</i> (Hindi)	<i>Madhavi</i>	VI/21
<i>Holarrhena antidysenterica</i> (L.) Wall. ex DC.	Easter tree, ivory tree	<i>Kutaja, kalinga</i>	IX/44
<i>Holoptelea integrifolia</i> (Roxb.) Planch.	<i>Papri, kanju</i> (Hindi)	<i>Chirabilva</i>	V/27

continued

Latin	English	Sanskrit	Verse
<i>Hordeum vulgare</i> L. emend Bow.	Barley	<i>Yava</i>	IV/56; VII/15, 36, 60; VIII/5, 6, 17
<i>Hygrophila auriculata</i> (Schum.) Heine	<i>Tal-makhana</i> (Hindi)	<i>Kokilaksha</i>	VIII/9, 30; IX/52
<i>Indigofera tinctoria</i> L.	Indigo	<i>Nili</i>	X/17
<i>Indigofera uniflora</i> Buch.-Ham.	Wild indigo	<i>Nili</i>	IX/12, 54
<i>Jasminum angustifolium</i> Vahl	Wild jasmine	<i>Asphota</i>	VI/21
<i>Jasminum grandiflorum</i> L.	Common jasmine	<i>Jati, malati</i>	VI/49; VIII/38
<i>Jasminum humile</i> L.	Yellow jasmine	<i>Hemapushpika, pitika</i>	VI/49
<i>Jasminum officinale</i> L.	Jasmine	<i>Bahugandha</i>	VI/48; IX/52
<i>Jasminum rotundifolium</i> Wall.	<i>Vanamallika</i> (Hindi)	<i>Vanamalliga</i>	IX/17
<i>Jasminum sambac</i> (L.) Ait.	Arabian jasmine, jasmine	<i>Mallika</i>	VI/48; VII/21
<i>Jatropha curcas</i> L.	Physic nut	<i>Dravanti</i>	VI/54
<i>Jatropha glandulifera</i> Roxb.	<i>Jangliarandi</i> (Hindi)	<i>Nikumba, dravanti</i>	IX/50, 52
<i>Lablab purpureus</i> (L.) Sweet	Lablab bean, field bean	<i>Nispavah, simbi</i>	VIII/22, 27; IX/2, 3, 43
<i>Laegenaria siceraria</i> (Molina) Standley	Bottle gourd	<i>Katutumbi, alavu</i>	VII/70; IX/3, 24, 30
<i>Lannea coromandelica</i> (Houtt.) Merr.	<i>Jhingan</i> (Hindi)	<i>Jhingini</i>	IX/26
<i>Lawsonia inermis</i> L.	Henna	<i>Nakha, nakharanjani</i>	VII/15, 29, 32, 35, 36, 54, 60
<i>Leonotis nepetaefolia</i> (L.) W. Ait.	<i>Granthiparni</i> (Kannada)	<i>Granthiparni</i>	VII/49
<i>Leucas aspera</i> (Willd.) Spreng	<i>Chhota halkusa</i> (Hindi)	<i>Dronapushpi</i>	IX/30
<i>Limonia acidissima</i> L.	Wood-apple	<i>Kapiththah</i>	VI/44; VII/56; VIII/42, 47, 49, 51
<i>Luffa acutangula</i> (L.) Roxb.	Ribbed gourd, ridged gourd	<i>Koshataki</i>	X/17
<i>Madhuca indica</i> J.F. Gmel.	Butter tree, mahua tree	<i>Madhuka</i>	V/29; VI/40
<i>Majorana hortensis</i> Moench	Sweet marjoram	<i>Marubaka</i>	VII/27-29, 35, 44, 60
<i>Mallotus philippensis</i> (Lamk.) Muell.-Arg.	Kamala tree	<i>Kampillakah</i>	VII/7, 9-10, 24, 49, 55
<i>Mammea longifolia</i> Planch. & Triana	Alexandrian laurel	<i>Pandunaga</i>	VII/58
<i>Mangifera indica</i> L.	Mango	<i>Amra</i>	VI/25, 26, 42, 44; VII/11; VIII/20, 32, 33, 48, 52
<i>Melia composita</i> Willd.	<i>Mahaneem</i> (Hindi)	<i>Arangaka, mahanimba</i>	X/21
<i>Mesua ferrea</i> L.	Ironwood	<i>Nagakesara</i>	VI/42, 44; VII/5, 40, 55; VIII/24, 53, 54, 57

continued

Latin	English	Sanskrit	Verse
<i>Meyna laxiflora</i> Robyns	<i>Pundrika</i> (Hindi)	<i>Pindituka</i>	IX/40
<i>Michelia champaca</i> L.	Champac	<i>Champaka</i>	VI/45; VII/2, 17, 42; VIII/48; XI/29
<i>Mimosa pudica</i> L.	Sensitive-plant	<i>Lajjalu, samanga</i>	IX/28
<i>Minusops elengi</i> L.	Spanish-cherry	<i>Bakulah</i>	VI/42, 44; VII/2, 41; VIII/25
<i>Momordica charantia</i> L.	Bitter gourd	<i>Karavella</i>	VI/54; VIII/21, 24; X/16, 21
<i>Moringa oleifera</i> Lamk.	Drumstick tree	<i>Sigruh</i>	VII/43, 48, 51; VIII/25; IX/52, 57
<i>Mucuna pruriens</i> (L.) DC.	Cowhage, horse-eye bean	<i>Atmagupta, kapikacchu</i>	VII/19, 21, 35
<i>Musa paradisiaca</i> L.	Banana	<i>Kadali, rambha</i>	VIII/19, 36
<i>Musa superba</i> Roxb.	Plantain	<i>Vanakadali, kadali</i>	VI/10, 21, 28-30
<i>Myristica fragrans</i> Houtt.	Nutmeg	<i>Jatiphalah</i>	VII/9-10, 64; VIII/54, 57
<i>Nardostachys jatamansi</i> (D. Don) DC	Nardus root, spikenard	<i>Jatamansi</i>	VII/5, 19, 21, 23, 27, 29, 31, 35, 43, 60
<i>Nelumbo nucifera</i> Gaertn.	Indian lotus	<i>Padma</i>	IV/56; VI/23, 49, 52; VII/2, 14, 50, 56; VIII/29, 31, 52; IX/15; XI/29, 30
<i>Nerium indicum</i> Mill.	Indian oleander	<i>Karavira</i>	VIII/31; X/23
<i>Nymphaea nouchali</i> Burm.f.	Indian red waterlily	<i>Kumuda, utpala</i>	IV/56; VI/23; VII/2
<i>Nymphaea stellata</i> Willd.	Indian blue waterlily	<i>Nilotpala</i>	VIII/39
<i>Ocimum sanctum</i> L.	Sacred basil	<i>Tulasi</i>	VIII/3, 25, 27; IX/52
<i>Ormocarpum cochinchinense</i> (Lour.) Merrill	<i>Kanashigra</i> (Hindi)	<i>Kananashekharā</i>	VII/13, 65
<i>Oroxylum indicum</i> (L.) Vent.	<i>Urru, sonapatha</i> (Hindi)	<i>Syonakah</i>	V/28
<i>Oryza sativa</i> L.	Rice, paddy	<i>Sali, tandula, vrihi</i>	VI/10, 31, 36; VII/28, 55, 65, 66, 70; VIII/2-4, 12, 13, 15, 17, 27, 28; IX/12, 19, 24, 27, 48; X/19
<i>Pandanus odoratissimus</i> L.f.	Screw-pine	<i>Ketaki</i>	VI/47; VII/2, 5, 16, 19, 21, 23, 32, 34, 35, 37, 42, 43, 48, 54, 58, 60, 61, 65, 66; IX/25
<i>Phoenix sylvestris</i> (L.) Roxb.	Wild date	<i>Kharjura</i>	VIII/8
<i>Phyllanthus fraternus</i> Webster	<i>Jaramla</i> (Hindi)	<i>Bhumyamalaki, tamalaki</i>	IX/14

continued

Latin	English	Sanskrit	Verse
<i>Picrorhiza kurroa</i> Royle ex Benth.	<i>Katki, kuru</i> (Hindi)	<i>Katuka, katuohini</i>	IX/32, 47, 57
<i>Pimenta racemosa</i> (Mill.) J.W. Moore	Bay tree		VII/7, 11
<i>Piper betle</i> L.	Betel pepper	<i>Nagavalli, tambula</i>	VIII/27; IX/30
<i>Piper chaba</i> Hunter	Java long pepper	<i>Chavika</i>	IX/57
<i>Piper longum</i> L.	Long pepper	<i>Pippali</i>	VI/45; VII/4; VIII/46; IX/11, 23, 34, 39–41, 47, 48, 55, 57; X/15, 23
<i>Piper nigrum</i> L.	Black pepper	<i>Maricha</i>	VII/11; VII/2, 4; VIII/11, 33, 36, 53–55, 57; IX/11, 16, 19, 23, 26, 55–57; X/15, 23
<i>Piper wallichii</i> Hand.-Mazz.	<i>Shambhalu ka beej</i> (Hindi)	<i>Renuka</i>	VII/9–10, 14, 19
<i>Plumbago zeylanica</i> L.	<i>Chita</i> (Hindi)	<i>Chitraka</i>	VIII/36, 48; IX/32, 41, 47, 57
<i>Pogostemon cablin</i> (Blanco) Benth.	Patchouli	<i>Pachi</i>	VII/2, 18, 27
<i>Pongamia pinnata</i> (L.) Pierre	Pongam	<i>Karanya, naktamala</i>	V/6, 22, 30; VII/30
<i>Portulaca quadrifida</i> L.	<i>Nonisaag</i> (Hindi)	<i>Laghulonika</i>	VIII/27
<i>Premna tomentosa</i> Willd.	Bastard teak	<i>Agnimantha, arani</i>	VII/2; IX/9
<i>Prosopis cineraria</i> (L.) Druce	<i>Sami, jand</i> (Hindi)	<i>Sami</i>	V/11
<i>Prunus cerasoides</i> D. Don	Wild Himalayan cherry	<i>Padmakah</i>	IX/50
<i>Psoralea corylifolia</i> L.	Babchi	<i>Bakuchi</i>	IX/2, 3
<i>Pterocarpus santalinus</i> L.f.	Red sandalwood	<i>Raktachandana</i>	VII/15
<i>Pterospermum acerifolium</i> Willd.	<i>Kanakchampa</i> (Hindi)	<i>Karnikara</i>	VIII/44; IX/55
<i>Punica granatum</i> L.	Pomegranate	<i>Dadima</i>	VI/21, 30, 35; VIII/56
<i>Rhododendron arboreum</i> Sm.	Indian rosebay, rose-tree	<i>Pullasa</i>	VII/42, 45; IX/52
<i>Ricinus communis</i> L.	Castor	<i>Eranda</i>	VII/69; VIII/21, 30; IX/37, 50
<i>Rubia cordifolia</i> L. sensu Hook.f.	Indian madder	<i>Manjishtha</i>	VII/15
<i>Ruta graveolens</i> L.	Garden rue	<i>Sadapaha, somalata</i>	IX/28
<i>Saccharum officinarum</i> L.	Sugarcane	<i>Ikshu</i>	VIII/37, 47, 54
<i>Salvadora persica</i> L.	Mustard tree	<i>Pilu</i>	V/32
<i>Santalum album</i> L.	White sandalwood	<i>Chandanam</i>	VI/47; VII/2, 5–7, 9–10, 24, 30–32, 34–36, 39, 41–43, 49, 52, 54, 55, 60, 61; XI/29
<i>Saraca asoca</i> (Roxb.) de Wilde	Asoka tree	<i>Ashoka</i>	V/28; VI/21, 42, 43

continued

Latin	English	Sanskrit	Verse
<i>Saussurea lappa</i> C.B. Clarke	Costus	<i>Kushtha</i>	VI/4, 40; VII/2, 7, 16, 18, 19, 21, 30, 34, 37, 50; IX/57
<i>Scindapsus officinalis</i> (Roxb.) Schott.	<i>Gajipipal</i> (Hindi)	<i>Gajapippali</i>	IX/16
<i>Selinum wallichianum</i> (DC.) Raizada & Saxena	<i>Mura</i> (Hindi)	<i>Mura</i>	VII/33
<i>Semecarpus anacardium</i> L.f.	Marking-nut	<i>Bhallataka</i>	V/27; VI/11
<i>Sesamum indicum</i> L.	Gingelly, sesame	<i>Tila</i>	IV/57, 72; VI/18, 32, 36, 37, 39, 43, 60; VII/12, 14, 16, 18, 20-24, 31; VIII/17, 27, 35, 42, 44; IX/2, 3, 10, 26, 28, 30, 36, 40, 42, 43, 55, 56; X/22
<i>Sesbania grandiflora</i> (L.) Poir.	Agati sesbania	<i>Agasthya</i>	VI/32; IX/2, 3, 5, 12
<i>Setaria italica</i> (L.) Beauv.	Foxtail millet	<i>Kangu</i>	IV/56
<i>Shorea robusta</i> Gaertn.f.	Sal dammar	<i>Sala</i>	VII/33, 58, 60
<i>Sida cordifolia</i> L.	Country-mallow	<i>Bala</i>	VIII/10
<i>Sida rhombifolia</i> L.	Broomjute sida	<i>Atibala, bala, mahabala</i>	VIII/43
<i>Solanum indicum</i> L.	Indian nightshade	<i>Brahati</i>	VI/6; IX/38
<i>Solanum melongena</i> L.	Brinjal, eggplant	<i>Bhantaki, vartaku</i>	VI/55
<i>Solanum nigrum</i> L.	Black nightshade	<i>Kakamachi</i>	IX/6
<i>Solanum sarmentosum</i> Nees	Kantakari (Hindi)	<i>Kantakari</i>	IX/38
<i>Solanum stramonifolium</i> Jacq.	Rambegun (Hindi)	<i>Garbhada</i>	IX/9
<i>Solanum surattense</i> Burm.f.	Yellow-berried nightshade	<i>Kantakari, nidigdhika</i>	V/17; IX/3, 9, 50
<i>Sorghum durra</i> (Forsk.) Stapf	Sorghum	<i>Yavanala</i>	IV/56
<i>Spondias pinnata</i> (L.f.) Kurz	Hog-plum	<i>Amrataka</i>	V/27
<i>Stereospermum personatum</i> (Hassk.) Chatt.	Yellow snake tree	<i>Patala</i>	V/28; VI/21; IX/37; X/23
<i>Symplocos racemosa</i> Roxb.	Lodh tree	<i>Lodhra</i>	VII/24
<i>Syzygium aromaticum</i> (L.) Merr. & Perry	Clove	<i>Lavanga</i>	VII/5, 7, 21; VIII/53
<i>Syzygium cerasoides</i> (Roxb.) Chatt. & Kanjilal	<i>Nayinerale</i> (Kannada)		VII/11; VIII/35
<i>Syzygium cumini</i> (L.) Skeels	Black plum, Java plum	<i>Jambu</i>	V/14, 28; VI/21, 26, 44, 46; VII/41; VIII/23, 36, 37, 47, 57; IX/47, 57
<i>Syzygium jambos</i> (L.) Alston	Rose apple	<i>Jambu</i>	VII/19, 21; VIII/36, 37
<i>Syzygium samarangense</i> (Bl.) Merr. & Perry	Samarang rose apple	<i>Jamrula</i>	VIII/37

continued

Latin	English	Sanskrit	Verse
<i>Tabernaemontana divaricata</i> (L.) R.Br. ex Roem & Schult.	Crape-jasmine	<i>Tagara</i>	VII/18-21, 28
<i>Tacca integrifolia</i> Ker.Gawl.	Patchouli	<i>Varahikanda</i> (Kannada)	IX/17
<i>Tacca lentopetaloides</i> (L.) O. Kuntze	Indian arrowroot	<i>Surana</i>	VII/13
<i>Tamarindus indica</i> L.	Tamarind	<i>Tintili, amlika</i>	VII/35; VIII/13, 21, 28, 36, 56; IX/20, 26
<i>Terminalia arjuna</i> (Roxb.) Wight & Arn.	Arjun	<i>Arjuna</i>	V/19; VI/12; VII/39, 50, 61
<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Belleric myrobalan	<i>Vibhitaka</i>	VII/3, 24, 38; IX/57
<i>Terminalia catappa</i> L.	Indian almond	<i>Vatama</i>	IX/26, 32
<i>Terminalia chebula</i> Retz.	Chebulic myrobalan	<i>Abhya, haritaki, pathya</i>	V/28, 38; VII/3, 24, 38, 40, 41, 43, 45, 58, 60; VIII/54; IX/28, 41, 49, 57
<i>Tinospora cordifolia</i> (Willd.) Miers ex Hook.f. & Thomas	<i>Gulancha</i> (Hindi)	<i>Amrita, guduchi</i>	VIII/27; IX/47
<i>Trachyspermum ammi</i> (L.) Sprague ex Turill	Ammi, carum, lovage	<i>Yavani</i>	IX/16, 41, 57
<i>Trachyspermum roxburghianum</i> (DC.) Craib	Aj mud	<i>Ajamoda</i>	IX/57
<i>Tribulus terrestris</i> L.	Land-caltrops	<i>Gokshura</i>	IX/50
<i>Trichodesma indicum</i> (L.) R.Br.	<i>Surasa</i> (Kannada)	<i>Adhupushpi</i>	IX/25
<i>Trichosanthes anguina</i> L.	Snake gourd	<i>Chichinda</i>	IX/37
<i>Trichosanthes cucumerina</i> L.	Bitter pointed gourd	<i>Patola</i>	VIII/30; IX/32, 48, 57
<i>Triticum dicoccum</i> Schubl.	Wheat-emmer	<i>Godhuma</i>	VIII/15; IX/37
<i>Vateria indica</i> L.	Malabar tallow tree	<i>Sarja</i>	IX/53
<i>Vernonia cinerea</i> (L.) Less.	Purple fleabane	<i>Sahadevi</i>	VII/21, 55
<i>Vetiveria zizanioides</i> (L.) Nash	Vetiver	<i>Sevya, ushira</i>	VI/18, 27, 46; VII/19; IX/1
<i>Vigna mungo</i> (L.) Hepper	Blackgram	<i>Masha</i>	VI/15, 36; VII/70; VIII/11, 16, 17
<i>Vigna radiata</i> (L.) Wilczek	Greengram	<i>Mudga</i>	VI/15; VIII/4; IX/3, 48
<i>Vitex negundo</i> L.	Chinese chest tree	<i>Nirgundi</i>	V/16; VIII/26; IX/15, 17, 30, 32, 38
<i>Vitis vinifera</i> L.	Wine grape	<i>Draksha</i>	VI/53; VIII/14
<i>Wendlandia exserta</i> (Roxb.) DC.		<i>Tilaka</i>	V/27
<i>Withania somnifera</i> (L.) Dunal	Vegetable rennet	<i>Ashvagandha</i>	IX/47

continued

Latin	English	Sanskrit	Verse
<i>Woodfordia fruticosa</i> (L.) Kurz <i>Zingiber officinale</i> Rosc.	Fire-flame bush, shiranjitea Ginger	<i>Dhataki</i> <i>Ardraka, sunthi</i>	VI/57 VII/4, 44, 69, 70; VIII/45, 53, 54; IX/11, 16, 19, 23, 26, 29, 34, 38, 40, 41, 44, 50, 52, 55, 57; X/15
<i>Ziziphus mauritiana</i> Lamk.	Jujube tree	<i>Badari, kola</i>	V/19, 23, 39; VI/37; VIII/13, 14, 27, 56; IX/45

A list of plant names – II

English	Latin	Verse
Agar	<i>Aquilaria malaccensis</i> Lamk.	VI/34, 49; VII/9–10, 18, 26, 30, 35–37, 42, 49, 52, 54, 55, 58, 60, 64; VIII/57
Agati sesbania	<i>Sesbania grandiflora</i> (L.) Poir.	VI/32; IX/2, 3, 5, 12
Ajmud	<i>Trachyspermum roxburghianum</i> (DC.) Craib	IX/57
Akund	<i>Calotropis procera</i> (Willd.) Dryand ex W. Ait.	IX/9
Alexandrian laurel	<i>Mammea longifolia</i> Planch. & Triana	VII/58
Aloe		(see Barbados aloe)
Amaranth (for vegetable)	<i>Amaranthus blitum</i> L. var. <i>oleracea</i> Duthie	V/12; VIII/22; IX/15
Amaranth (grain)	<i>Amaranthus cruentus</i> L.	VIII/9
Ammi	<i>Trachyspermum ammi</i> (L.) Sprague ex Turill	IX/16, 41, 57
Arabian jasmine	<i>Jasminum sambac</i> (L.) Ait.	VII/48; VII/21
Arani (Hindi)	<i>Clerodendrum phlomidis</i> L.f.	IX/50
Arecanut	<i>Areca catechu</i> L.	VI/45; VII/3, 19, 23, 32; IX/8, 28
Arjun	<i>Terminalia arjuna</i> (Roxb.) Wight & Arn.	V/19; VI/12; VII/39, 50, 61
Asafetida	<i>Ferula assafoetida</i> L.	VI/11; VII/15, 68, 69; VIII/11, 17, 53; IX/16, 32, 41, 57
Asiatic pennywort	<i>Centella asiatica</i> (L.) Urban	IX/32, 42
Asoka tree	<i>Saraca asoca</i> (Roxb.) de Wilde	V/28; VI/21, 42, 43
Atis (Hindi)	<i>Aconitum heterophyllum</i> Wall. ex Royale	VI/11; IX/41, 44, 57
Babchi	<i>Psoralea corylifolia</i> L.	IX/2, 3
Baberang (Hindi)	<i>Embelia ribes</i> Burm.f.	VI/6, 11, 12, 13, 18, 32; VII/39; IX/32, 36, 50, 57
Bael	<i>Aegle marmelos</i> (L.) Corr.	V/19, 27; VI/38, 44; VII/11, 25, 26, 36, 41, 50, 52, 58, 63, 70; VII/20; IX/15, 37, 45, 50
Bahupushpa (Hindi)	<i>Breynia retusa</i> (Dennst.) Alston	VIII/18
Bamboo	<i>Bambusa arundinacea</i> (Retz.) Willd.	VIII/50; IX/13
Banana	<i>Musa paradisiaca</i> L.	VIII/19, 36
Banyan	<i>Ficus benghalensis</i> L.	V/31; VI/26; VII/56; IX/15
Barbados aloe	<i>Aloe barbadensis</i> Mill.	VIII/27; IX/54
Barley	<i>Hordeum vulgare</i> L. emend Bow.	IV/56; VI/15, 36, 60; VIII/5, 6, 17

English	Latin	Verse
Barna (Hindi)	<i>Crataeva nurvala</i> Buch.-Ham.	VII/56
Bastard teak	<i>Premna tomentosa</i> Willd.	VII/2; IX/9
Bay tree	<i>Pimenta racemosa</i> (Mill.) J.W. Moore	VII/7, 11
Belleric myrobalan	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	VII/3, 24, 38; IX/57
Bengal quince	<i>Aegle marmelos</i> (L.) Corr.	V/19, 27; VI/38, 44; VII/11, 25, 26, 36, 41, 50, 52, 58, 63, 70; VIII/20; IX/15, 37, 45, 50
Bermuda grass	<i>Cynodon dactylon</i> (L.) Pers.	V/34; VIII/36; IX/4
Betel pepper	<i>Piper betle</i> L.	VIII/27; IX/30
Bhangra, mochkand (Hindi)	<i>Eclipta prostrata</i> (L.) L.	IX/28; X/17
Biswal (Hindi)	<i>Acacia pennata</i> (L.) Willd.	VIII/27
Bitter apple	<i>Citrullus colocynthis</i> (L.) Kuntze	IX/26, 32; X/16
Bitter gourd	<i>Momordica charantia</i> L.	VI/54; VIII/21, 24; X/16, 21
Bitter pointed gourd	<i>Trichosanthes cucumerina</i> L.	VIII/30; IX/32, 48, 57
Black mustard	<i>Brassica nigra</i> (L.) Koch	IV/47; VI/10-12; VIII/16, 55; IX/8, 10, 19, 30, 52, 57; X/21
Black nightshade	<i>Solanum nigrum</i> L.	IX/6
Black pepper	<i>Piper nigrum</i> L.	VI/11; VII/2, 4; VIII/11, 33, 36, 53-55, 57; IX/11, 16, 19, 23, 26, 55-57; X/15, 23
Black plum	<i>Syzygium cumini</i> (L.) Skeels	V/14, 28; VI/21, 26, 44, 46; VII/41; VIII/23, 36, 37, 47, 57; IX/47, 57
Black siris	<i>Albizia odoratissima</i> (L.f.) Benth	X/19
Blackgram	<i>Vigna mungo</i> (L.) Hepper	VI/15, 36; VII/70; VIII/11, 16, 17
Bonduc nut	<i>Caesalpinia crista</i> L.	VII/15, 27, 30, 32, 33, 35, 64; IX/26, 57
Bottle gourd	<i>Lagenaria siceraria</i> (Molina) Standley	VII/70; IX/3, 24, 30
Bracteated birthwort	<i>Aristolochia bracteolata</i> Lamk.	VIII/29; X/16
Brahmi	<i>Centella asiatica</i> (L.) Urban	IX/32, 42
Brinjal, eggplant	<i>Solanum melongena</i> L.	VI/55
Broomjute sida	<i>Sida rhombifolia</i> L.	VIII/43
Butter tree	<i>Madhuca indica</i> J.F. Gmel.	V/29; VI/40
Calambac	<i>Aquilaria malaccensis</i> Lamk.	VI/34, 49; VII/9-10, 18, 26, 30, 35-37, 42, 49, 52, 54, 55, 58, 60, 64; VIII/57
Camel thorn	<i>Alhagi pseudalhagi</i> (Bieb.) Desv.	IX/41, 50

continued

English	Latin	Verse
Cardamom	<i>Elettaria cardamomum</i> Maton	VII/2, 4, 5, 19, 21, 23, 27, 28, 43, 51; VIII/5, 7, 10, 55, 57
Carum	<i>Trachyspermum ammi</i> (L.) Sprague ex Turill	IX/16, 41, 57
Castor	<i>Ricinus communis</i> L.	VII/69; VIII/21, 30; IX/37, 50
Catechu	<i>Acacia catechu</i> (L.f.) Willd.	VII/4, 9–10, 62; IX/47
Celery	<i>Apium graveolens</i> L. var. <i>dulce</i> (Mill.) DC.	IX/57
Champac	<i>Michelia champaca</i> L.	VI/45; VII/2, 17, 42; VIII/48; XI/29
Chebulic myrobalan	<i>Terminalia chebula</i> Retz.	V/28, 38; VII/3, 24, 38, 40, 41, 43, 45, 58, 60; VIII/54; IX/28, 41, 49, 57
<i>Chhota halkusa</i> (Hindi)	<i>Leucas aspera</i> (Willd.) Spreng	IX/30
Chickpea	<i>Cicer arietinum</i> L.	VII/52; VIII/15, 16, 45
Chinese chest tree	<i>Vitex negundo</i> L.	V/16; VIII/26; IX/15, 17, 30, 32, 38
<i>Chita</i> (Hindi)	<i>Plumbago zeylanica</i> L.	VIII/36, 48; IX/32, 41, 47, 57
<i>Chuka</i> (Hindi)	<i>Croton oblongifolius</i> Roxb.	VII/11
Cinnamon	<i>Cinnamomum zeylanicum</i> Blume	VII/2–4, 16, 18, 19, 27, 28, 32, 44, 45, 51, 64; VIII/5, 7, 10, 14, 53–55, 57
Citron	<i>Citrus medica</i> L.	VI/21, 34; VII/8, 11, 53, 55; VIII/3, 34, 53, 56
Clove	<i>Syzygium aromaticum</i> (L.) Merr. & Perry	VII/5, 7, 21; VIII/53
Cluster fig	<i>Ficus glomerata</i> Roxb.	V/20
Cock's comb	<i>Celosia cristata</i> L.	X/21
Coconut	<i>Cocos nucifera</i> L.	V/26; VI/32; VIII/7, 8, 46
Coffee senna	<i>Cassia occidentalis</i> L.	VIII/17, 22
Colocynth	<i>Citrullus colocynthis</i> (L.) Kuntze	IX/26, 32; X/16
Common jasmine	<i>Jasminum grandiflorum</i> L.	VI/49; VIII/38
Coriander	<i>Coriandrum sativum</i> L.	VII/4, 44; VIII/11, 41, 55; IX/41
Costus	<i>Saussurea lappa</i> C.B. Clarke	VI/40; VII/2, 7, 16, 18, 19, 21, 30, 34, 37, 50; IX/57
Cotton	<i>Gossypium arboreum</i> L.	VIII/26; IX/23
Country-mallow	<i>Sida cordifolia</i> L.	VIII/10
Cowhage	<i>Mucuna pruriens</i> (L.) DC.	VII/19, 21, 35
Crape-jasmine	<i>Tabernaemontana divaricata</i> (L.) R.Br. ex Roem & Schult.	VII/18–21, 28
Croton	<i>Croton tiglium</i> L.	IX/47

continued

English	Latin	Verse
Cumin	<i>Cuminum cyminum</i> L.	VIII/11, 53, 55; IX/7, 57
<i>Dab, darbha, durva</i> (Hindi)	<i>Desmostachya bipinnata</i> (L.) Stapf	V/28, 34
<i>Dantt</i> (Hindi)	<i>Baliospermum montanum</i> (Willd.) Muell.-Arg.	VII/18
Date		(see wild date)
<i>Daya</i> (Hindi)	<i>Callicarpa macrophylla</i> Vahl	VI/42
Deodar	<i>Cedrus deodara</i> (Roxb. ex Lamb.) G. Don	VI/45; VII/19, 26, 33, 51, 58; IX/36, 47
Dita bark tree	<i>Alstonia scholaris</i> (L.) R.Br.	IX/37, 47, 57
Drumstick tree	<i>Moringa oleifera</i> Lamk.	VII/43, 48, 51; VIII/25; IX/52, 57
Eagle wood	<i>Aquilaria malaccensis</i> Lamk.	VI/34, 49; VII/9–10, 18, 26, 30, 35–37, 42, 49, 52, 54, 55, 58, 60, 64; VIII/57
East Indian arrowroot	<i>Curcuma angustifolia</i> Roxb.	VII/9–10
Easter tree	<i>Holarrhena antidysenterica</i> (L.) Wall. ex DC.	IX/44
Elephant-foot yam	<i>Amorphophallus campanulatus</i> (Roxb.) Blume ex Dcne.	VIII/27, 28; IX/52
Emblic myrobalan	<i>Embelia officinalis</i> Gaertn.	V/17, 27; VI/34, 39; VII/24, 27, 28; VIII/20, 49, 56
False pareira root	<i>Cissampelos pareira</i> L.	VII/47
Fan palm	<i>Corypha umbraculifera</i> L.	VIII/34
Field bean	<i>Lablab purpureus</i> (L.) Sweet	VIII/22, 27; IX/2, 3
Fig	<i>Ficus carica</i> L.	VI/26; VII/56
Fire-flame bush	<i>Woodfordia fruticosa</i> (L.) Kurz	VI/57
Flame of the forest	<i>Butea monosperma</i> (Lamk.) Taubert	V/19, 34, 37, 38; VIII/21
Foxtail millet	<i>Setaria italica</i> (L.) Beauv.	IV/56
<i>Gajipipal</i> (Hindi)	<i>Scindapsus officinalis</i> (Roxb.) Schott.	IX/16
Garden rue	<i>Ruta graveolens</i> L.	IX/28
Garlic	<i>Allium sativum</i> L.	VII/68, 70; VIII/27; IX/16; XI/29
Gingelly	<i>Sesamum indicum</i> L.	IV/57, 72; VI/18, 32, 36, 37, 39, 43, 60; VII/12, 14, 16, 18, 20–24, 31; VIII/17, 27, 35, 42, 44; IX/2, 3, 10, 26, 28, 30, 36, 40, 42, 43, 55, 56; X/22
Ginger	<i>Zingiber officinale</i> Rosc.	VII/4, 44, 69, 70; VIII/45, 53, 54; IX/11, 16, 19, 23, 26, 29, 34, 38, 40, 41, 44, 50, 52, 55, 57; X/15
<i>Gitoran, ardanda</i> (Hindi)	<i>Capparis zeylanica</i> L.	VIII/30

continued

English	Latin	Verse
Gokarni (Hindi)	<i>Clitoria ternatea</i> L.	IX/24, 32; X/16, 17
Granthiparni (Kannada)	<i>Leonotis nepetaefolia</i> (L.) W. Ait.	VII/49
Grape		(see wine grape)
Greater galangal	<i>Alpinia galanga</i> (L.) Sw.	IX/25, 34, 50, 57
Greengram	<i>Vigna radiata</i> (L.) Wilczek	VII/15; VIII/4; IX/3, 48
Gudari saag (Hindi)	<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	VIII/19
Gulancha (Hindi)	<i>Tinospora cordifolia</i> (Willd.) Miers ex Hook.f. & Thomas	VIII/27; IX/47
Hatisura (Hindi)	<i>Heliotropium indicum</i> L.	VII/18, 28, 34, 35, 37, 55
Henna	<i>Lawsonia inermis</i> L.	VII/15, 29, 32, 35, 36, 54, 60
Himalayan cedar	<i>Cedrus deodara</i> (Roxb. ex Lamb.) G. Don	VII/45; VII/19, 26, 33, 51, 58; IX/36, 47
Hog-plum	<i>Spondias pinnata</i> (L.f.) Kurz	V/27
Horse-eye bean	<i>Mucuna pruriens</i> (L.) DC.	VII/19, 21, 35
Horsegram	<i>Dolichos uniflorus</i> Lam.	IX/17, 33
Indian abutilon	<i>Abutilon indicum</i> (L.) Sweet	VIII/10
Indian almond	<i>Terminalia catappa</i> L.	IX/26, 32
Indian arrowroot	<i>Tacca lentopetaloides</i> (L.) O. Kuntze	VII/13
Indian barberry	<i>Berberis aristata</i> DC.	VII/56; IX/34, 52, 55
Indian bdellium tree	<i>Commiphora wightii</i> (Arnott) Bhandari com.nov.	VI/12; VII/3, 7, 11, 13, 27, 32, 42, 46, 55, 57, 58, 60; IX/28
Indian beech	<i>Fagus sylvatica</i> L.	VIII/23; IX/57; X/21
Indian birch	<i>Betula alnoides</i> Buch.-Ham.	VII/67
Indian blue waterlily	<i>Nymphaea stellata</i> Willd.	VIII/39
Indian butter-tree	<i>Diploknema butyracea</i> (Roxb.) H.J. Lam.	VII/38
Indian caper	<i>Capparis sepieria</i> L.	IX/24
Indian cherry	<i>Cordia dichotoma</i> var. <i>wallichii</i> (Cl.) Maheshwari	VIII/27
Indian coral tree	<i>Erythrina indica</i> Lamk. var. <i>parcellii</i> Hort.	IX/43
Indian dill	<i>Anethum sowa</i> Kurz	VI/14; VII/41; VIII/40; IX/50
Indian frankincense	<i>Boswellia serrata</i> Roxb. ex Colebr.	VII/13, 29, 31, 32, 44, 58
Indian gooseberry	<i>Emblica officinalis</i> Gaertn.	V/17, 27; VI/34, 39; VII/24, 27, 28; VIII/20, 49, 56
Indian laurel	<i>Calophyllum inophyllum</i> L.	VII/46

continued

English	Latin	Verse
Indian lotus	<i>Nelumbo nucifera</i> Gaertn.	IV/56; VI/23, 49, 52; VII/2, 14, 50, 56; VIII/29, 31, 52; IX/15; XI/29, 30
Indian madder	<i>Rubia cordifolia</i> L. sensu Hook.f.	VII/15
Indian nightshade	<i>Solanum indicum</i> L.	VI/6; IX/38
Indian oleander	<i>Nerium indicum</i> Mill.	VIII/31; X/23
Indian olibanum	<i>Boswellia serrata</i> Roxb. ex Colebr.	VII/13, 29, 31, 32, 44, 58
Indian persimmon	<i>Diospyros peregrina</i> (Gaertn.) Gurke	V/37; VII/46; IX/41
Indian red waterlily	<i>Nymphaea nouchali</i> Burm.f.	IV/56; VI/23; VII/2
Indian rosebay	<i>Rhododendron arboreum</i> Sm.	VII/42, 45; IX/52
Indian spinach	<i>Basella alba</i> L.	IX/15
Indian tree spurge	<i>Euphorbia tirucalli</i> L.	VIII/27; IX/53
Indian wormwood fleabane	<i>Artemisia nilagirica</i> (Clarke) Pamp.	VII/28
Indigo	<i>Indigofera tinctoria</i> L.	X/17
<i>Indrayan</i> (Hindi)	<i>Cucumis pseudo-colocynthis</i> Royale	VI/11
Ironwood	<i>Mesua ferrea</i> L.	VII/42, 44; VII/5, 40, 55; VIII/24, 53, 54, 57
Ivory tree	<i>Holarrhena antidysenterica</i> (L.) Wall. ex DC.	IX/44
Ivy gourd	<i>Coccinea grandis</i> (L.) Voigt	VIII/30; IX/14
Jack fruit	<i>Artocarpus heterophyllus</i> Lamk.	VI/21, 26, 31; VII/56; VIII/35
<i>Jamti ki bel</i> (Hindi)	<i>Cocculus hirsutus</i> (L.) Diels	IX/14, 24; X/16
<i>Jangliarandi</i> (Hindi)	<i>Jatropha glandulifera</i> Roxb.	IX/50, 52
<i>Jaramla</i> (Hindi)	<i>Phyllanthus fraternus</i> Webster	IX/14
Jasmine	<i>Jasminum officinale</i> L.	VI/48; IX/52
Jasmine	<i>Jasminum sambac</i> (L.) Ait.	VI/48; VII/21
Java long pepper	<i>Piper chaba</i> Hunter	IX/57
Java plum	<i>Syzygium cumini</i> (L.) Skeels	V/14, 28; VI/21, 26, 44, 46; VII/41; VIII/23, 36, 37, 47, 57; IX/47, 57
Jecquirity seeds	<i>Abrus precatorius</i> L.	VI/45; VIII/25, 31; IX/4, 13
<i>Jhingan</i> (Hindi)	<i>Lannea coromandelica</i> (Houtt.) Merr.	IX/26
Jujube tree	<i>Ziziphus mauritiana</i> Lamk.	V/19, 23, 39; VI/37; VIII/13, 14, 27, 56; IX/45
Kadam	<i>Anthocephalus cadamba</i> (Roxb.) Miq.	V/33; VII/2

continued

English	Latin	Verse
<i>Kaladhatura</i> (Hindi)	<i>Datura metel</i> L.	IX/15
Kamala tree	<i>Mallotus philippensis</i> (Lamk.) Muell.-Arg.	VII/7, 9-10, 24, 49, 55
<i>Kanakchampa</i> (Hindi)	<i>Pterospermum acerifolium</i> Willd.	VIII/44; IX/55
<i>Kanashigra</i> (Hindi)	<i>Ornocarpum cochinchinense</i> (Lour.) Merrill	VII/13, 65
<i>Kantakari</i> (Hindi)	<i>Solanum sarmentosum</i> Nees	IX/38
<i>Katki, kuru</i> (Hindi)	<i>Picrorhiza kurroa</i> Royle ex Benth.	IX/32, 47, 57
King of bitters	<i>Andrographis paniculata</i> (Burm.f.) Wall. ex Nees	IX/47
<i>Kodhab</i> (Hindi)	<i>Cadaba fruticosa</i> (L.) Druce	IX/8
Lablab bean	<i>Lablab purpureus</i> (L.) Sweet	VIII/22, 27; IX/2, 3, 43
Land-caltrops	<i>Tribulus terrestris</i> L.	IX/50
Lebbeck-tree	<i>Albizia lebbeck</i> (L.) Benth.	V/27, 29; VII/3; VIII/27; IX/37
Lemon	<i>Citrus limon</i> (L.) Burm.f.	VII/44
Licorice	<i>Glycyrrhiza glabra</i> L.	VI/37, 40; VII/14; IX/34, 44
Lodh tree	<i>Symplocos racemosa</i> Roxb.	VII/24
Long pepper	<i>Piper longum</i> L.	VI/45; VII/4; VIII/46; IX/11, 23, 34, 39-41, 47, 48, 55, 57; X/15, 23
Lovage	<i>Trachyspermum ammi</i> (L.) Sprague ex Turill	IX/16, 41, 57
Madar	<i>Calotropis gigantea</i> Ait.	V/40; VIII/27; IX/10, 13, 25, 26, 28, 30, 32, 52; X/23
<i>Madhavilata</i> (Hindi)	<i>Hiptage benghalensis</i> (L.) Kurz	VI/21
<i>Mahaneem</i> (Hindi)	<i>Melia composita</i> Willd.	X/21
Mahua tree	<i>Madhuca indica</i> J.F. Gmel.	V/29; VI/40
Maidenhair fern	<i>Adiantum capillus-veneris</i> L.	VII/52
Malabar nut	<i>Adhatoda vasica</i> Nees	IX/32, 37, 38, 45, 50
Malabar tallow tree	<i>Vateria indica</i> L.	IX/53
Malay bush-beech	<i>Gmelina arborea</i> L.	IX/37
Mango	<i>Mangifera indica</i> L.	VII/25, 26, 42, 44; VII/11; VIII/20, 32, 33, 48, 52
Margosa	<i>Azadirachta indica</i> A. Juss	V/30; VI/38, 45; VII/68; VIII/25; IX/17, 21, 29, 32, 38, 47, 48, 57
Marking-nut	<i>Semecarpus anacardium</i> L.f.	V/27; VI/11
<i>Merasingi</i> (Hindi)	<i>Gymnema sylvestre</i> (Retz.) Schult.	VIII/23
Milk-bush	<i>Euphorbia tirucalli</i> L.	VIII/27; IX/53

continued

English	Latin	Verse
Molucca bean	<i>Caesalpinia cristata</i> L.	VII/15, 27, 30, 32, 33, 35, 64; IX/26, 57
Monkey jack fruit	<i>Artocarpus lakoocha</i> Roxb.	VII/50
Mountain ebony	<i>Bauhinia variegata</i> L.	V/35
<i>Mura</i> (Hindi)	<i>Selinum wallichianum</i> (DC.) Raizada & Saxena	VII/33
<i>Mura</i> (Hindi)	<i>Erythrina stricta</i> Roxb.	VII/26
Mustard	<i>Brassica nigra</i> (L.) Koch	IV/47; VII/10-12; VIII/16, 55; IX/8, 10, 19, 30, 40, 52, 57; X/21
Mustard tree	<i>Salvadora persica</i> L.	V/32
Myrobalan emblic	<i>Emblica fischeri</i> Gamble	IX/57
Nardus root	<i>Nardostachys jatamansi</i> (D. Don) DC.	VII/5, 19, 21, 23, 27, 29, 31, 35, 43, 60
<i>Nayinerale</i> (Kannada)	<i>Syzygium cerasoides</i> (Roxb.) Chatt. & Kanjilal	VII/11; VIII/35
Neem tree	<i>Azadirachta indica</i> A. Juss	V/30; VII/38, 45; VII/68; VIII/25; IX/17, 21, 29, 32, 38, 47, 48, 57
<i>Nonisaag</i> (Hindi)	<i>Portulaca quadrifida</i> L.	VIII/27
Nut grass	<i>Cyperus rotundus</i> L.	VI/27, 46; VII/4, 5, 32, 35, 38, 43; VIII/57; IX/7, 36, 47, 50
Nutmeg	<i>Myristica fragrans</i> Houtt.	VII/9-10, 64; VIII/54, 57
Onion	<i>Allium cepa</i> L.	VIII/27
Paddy	<i>Oryza sativa</i> L.	VI/10, 31, 36; VII/28, 55, 65, 66, 70; VIII/2-4, 12, 13, 15, 17, 27, 28; IX/12, 19, 24, 27, 48; X/19
Palma rosa	<i>Cymbopogon martinii</i> (Roxb.) Wats.	V/28
Palmyra palm	<i>Borassus flabellifer</i> L.	V/24, 26
<i>Papri, kanju</i> (Hindi)	<i>Holoptelea integrifolia</i> (Roxb.) Planch.	V/27
<i>Patalagaruda</i> (Sanskrit)	<i>Cocculus hirsutus</i> (L.) Diels	IX/14, 24; X/16
Patchouli	<i>Pogostemon cablin</i> (Blanco) Benth.	VII/2, 18, 27
Physic nut	<i>Jatropha curcas</i> L.	VI/54
<i>Pilkhan</i> (Hindi)	<i>Ficus lucescens</i> Blume	VI/26; VII/56
Pipal	<i>Ficus religiosa</i> L.	VI/26; VII/56; VIII/20
Plantain	<i>Musa superba</i> Roxb.	VI/10, 21, 28-30
Pomegranate	<i>Punica granatum</i> L.	VI/21, 30, 35; VIII/56
Pongam	<i>Pongamia pinnata</i> (L.) Pierre	V/6, 22, 30; VII/30
Prickly chaff flower plant	<i>Achyranthes aspera</i> L.	VIII/43; IX/6, 28

continued

English	Latin	Verse
Pundrika (Hindi)	<i>Meyna laxiflora</i> Robyns	IX/40
Puneala plum	<i>Flacourzia jangomas</i> (Lour.) Raeusch.	X/17
Purple fleabane	<i>Vernonia cinerea</i> (L.) Less.	VII/21, 55
Rambegun	<i>Solanum stramonifolium</i> Jacq.	IX/9
Red gourd	<i>Cucurbita maxima</i> Duch.	VI/55
Red pumpkin	<i>Cucurbita maxima</i> Duch.	VI/55
Red sandalwood	<i>Pterocarpus santalinus</i> L.f.	VII/15
Red silk-cotton	<i>Bombax ceiba</i> L.	IX/4
Ribbed gourd	<i>Luffa acutangula</i> (L.) Roxb.	X/17
Rice	<i>Oryza sativa</i> L.	VI/10, 31, 36; VII/28, 55, 65, 66, 70; VIII/2-4, 12, 13, 15, 17, 27, 28; IX/12, 19, 24, 27, 48; X/19
Ridged gourd	<i>Luffa acutangula</i> (L.) Roxb.	X/17
Rose apple	<i>Syzygium jambos</i> (L.) Alston	VII/19, 21; VIII/36, 37
Rose-tree	<i>Rhododendron arboreum</i> Sm.	VII/42, 45; IX/52
Sacred basil	<i>Ocimum sanctum</i> L.	VIII/3, 25, 27; IX/52
Sacred grass	<i>Cynodon dactylon</i> (L.) Pers.	V/34; VIII/36; IX/4
Safflower	<i>Carthamus tinctorius</i> L.	VII/62
Saffron	<i>Crocus sativus</i> L.	VII/24; VIII/5, 7, 14, 52
Sage-leaved alangium	<i>Alangium salvifolium</i> (L.f.) Wang.	V/27; VI/19, 25, 30, 54, 57
Sal dammar	<i>Shorea robusta</i> Gaertn.f.	VII/33, 58, 60
Samarang rose apple	<i>Syzygium samarangense</i> (Bl.) Merr. & Perry	VIII/37
<i>Sami, jand</i> (Hindi)	<i>Prosopis cineraria</i> (L.) Druce	V/11 (see white sandalwood)
Sandalwood		VIII/27
<i>Satmuli, satawar</i> (Hindi)	<i>Asparagus racemosus</i> Willd.	VII/2; VII/2, 5, 16, 19, 21, 23, 32, 34, 35, 37, 42, 43, 48, 54, 58, 60, 61, 65, 66; IX/25
Screw-pine	<i>Pandanus odoratissimus</i> L.f.	VIII/27
Sebesten	<i>Cordia dichotoma</i> var. <i>wallichii</i> (Cl.) Maheshwari	VIII/27
Sensitive-plant	<i>Mimosa pudica</i> L.	IX/28

continued

English	Latin	Verse
Sesame	<i>Sesamum indicum</i> L.	IV/57, 72; VI/18, 32, 36, 37, 39, 43, 60; VII/12, 14, 16, 18, 20–24, 31; VIII/17, 27, 35, 42, 44; IX/2, 3, 10, 26, 28, 30, 36, 40, 42, 43, 55, 56; X/22
<i>Shambhalu ka beej</i> (Hindi)	<i>Piper wallichii</i> Hand.-Mazz.	VII/9–10, 14, 19
Shiranjitea	<i>Woodfordia fruticosa</i> (L.) Kurz	VI/57
Shoe-flower	<i>Hibiscus rosa-sinensis</i> L.	VI/50; VIII/18
Silk cotton	<i>Ceiba pentandra</i> (L.) Gaertn.	IX/28
Siris	<i>Albizia lebbeck</i> (L.) Benth.	V/27, 29; VII/3; VIII/27; IX/37
Snake gourd	<i>Trichosanthes anguina</i> L.	IX/37
Sorghum	<i>Sorghum durra</i> (Forsk.) Stapf	IV/56
Spanish-cherry	<i>Mimusops elengi</i> L.	VI/42, 44; VII/2, 41; VIII/25
Spikenard	<i>Nardostachys jatamansi</i> (D. Don) DC.	VII/5, 19, 21, 23, 27, 29, 31, 35, 43, 60
Sugarcane	<i>Saccharum officinarum</i> L.	VIII/37, 47, 54
<i>Surasa</i> (Kannada)	<i>Trichodesma indicum</i> (L.) R.Br.	IX/25
Swamp pea	<i>Sesbania grandiflora</i> (L.) Poir.	VI/32; IX/2, 3, 5, 12
Sweet flag	<i>Acorus calamus</i> L.	VII/11, 45; VII/3; IX/8, 16, 40, 57; X/21; XI/29
Sweet marjoram	<i>Majorana hortensis</i> Moench	VII/27–29, 35, 44, 60
Sweet orange	<i>Citrus sinensis</i> (L.) Osbeck	VI/33
<i>Tadrelu</i> (Hindi)	<i>Barleria cristata</i> L.	VI/50
Talipot palm	<i>Corypha umbraculifera</i> L.	VIII/34
<i>Tal-makhana</i> (Hindi)	<i>Hygrophila auriculata</i> (Schum.) Heine	VIII/9, 30; IX/52
Tamarind	<i>Tamarindus indica</i> L.	VII/35; VIII/13, 21, 28, 36, 56; IX/20, 26
Thorn apple	<i>Datura stramonium</i> L.	VIII/14; VIII/31, 38; IX/25
Tree cotton	<i>Gossypium arboreum</i> L.	VIII/26; IX/23
Trumpet flower	<i>Bignonia crispa</i> Buch.-Ham.	VII/2, 18
Tube flower	<i>Clerodendrum indicum</i> (L.) Kuntze	V/17; VII/26; IX/38
Turk's turban	<i>Clerodendrum indicum</i> (L.) Kuntze	V/17; VII/26; IX/38
Turmeric	<i>Curcuma domestica</i> Val.	VII/12, 45; VII/14; VIII/17, 22, 26; IX/16, 25, 28, 34, 52, 54, 55
<i>Urru, sonapatha</i> (Hindi)	<i>Oroxylum indicum</i> (L.) Vent.	V/28

continued

English	Latin	Verse
Utakanta (Hindi)	<i>Echinops echinatus</i> Roxb.	IX/27
Vanamallika (Hindi)	<i>Jasminum rotundifolium</i> Wall.	IX/17
Varahikanda (Kannada)	<i>Tacca integrifolia</i> Ker. Gawl.	IX/17
Vasaka (Sanskrit)	<i>Adhatoda vasica</i> Nees	IX/32, 37, 38, 45, 50
Vegetable rennet	<i>Withania somnifera</i> (L.) Dunal	IX/47
Vetiver	<i>Vetiveria zizanioides</i> (L.) Nash	VI/18, 27, 46; VII/19; IX/1
Vidanga (Sanskrit)	<i>Embelia ribes</i> Burm.f.	VI/6, 11–13, 18, 32; VII/39; IX/32, 36, 50, 57
Wax jambu	<i>Syzygium samarangense</i> (Bl.) Merr. & Perry	VIII/37
Wheat-emmer	<i>Triticum dicoccum</i> Schubl.	VIII/15; IX/37
White damar	<i>Vateria indica</i> L.	IX/53
White mustard	<i>Brassica alba</i> (L.) Rabenh.	VI/45
White sandalwood	<i>Santalum album</i> L.	VI/47; VII/2, 5–7, 9–10, 24, 30–32, 34–36, 39, 41–43, 49, 52, 54, 55, 60, 61; XI/29
Wild date	<i>Phoenix sylvestris</i> (L.) Roxb.	VIII/8, 14
Wild fig	<i>Ficus hispida</i> L.f.	V/21
Wild Himalayan cherry	<i>Prunus cerasoides</i> D. Don	IX/50
Wild indigo	<i>Indigofera uniflora</i> Buch.-Ham.	IX/12, 54
Wild jasmine	<i>Jasminum angustifolium</i> Vahl	VI/21
Wild turmeric	<i>Curcuma aromatica</i> Salisb., <i>C. zedoaria</i> (Berg.) Rose	VII/23, 28; VIII/54; IX/16, 26, 32; X/22
Wine grape	<i>Vitis vinifera</i> L.	VI/53; VIII/14
Wood-apple	<i>Limonia acidissima</i> L.	VI/44; VII/56; VIII/42, 47, 49, 51
Yellow jasmine	<i>Jasminum humile</i> L.	VI/49
Yellow snake tree	<i>Stereospermum personatum</i> (Hassk.) Chatt.	V/28; VI/21; IX/37; X/23
Yellow-berried nightshade	<i>Solanum surattense</i> Burm.f.	V/17; IX/3, 9, 50
Zedoary	<i>Curcuma aromatica</i> Salisb., <i>C. zedoaria</i> (Berg.) Rose	VII/23, 28; VIII/54; IX/16, 26, 32; X/22



Appendix

॥ ೪೬ ॥

ಲೈ ೧ ಕೈ ೧ ಪ ಕಾರಂ

(ಜಾಘ್ರಂಡರಾಯ ವಿರಚಿತಂ)

ಪ್ರಧಾಮಾಧಿಕಾರಂ

ಂ ಪ ೦ ಜಾ ೦ ಗ ಘ ಅ ವ ಜ ೯ ನ ೦

ಪೀಠಿಕೆ

ಕೆಂ || ೧ ಶ್ರೀ ಪತಿಯುಂ ಸಕಲವಚ |
 ಶ್ರೀ ಪತಿಯುಂ ಮಾಪತಿಯುಂ ಮೆಸುಗಮಾದರದಿಂ ||
 ಶ್ರೀ ಪದಮಂ ಸಕಳವಚ |
 ಶ್ರೀ ಪದಮಂ ಪರಮಪದಮಂ ನೀಗಭಿವಂಘ್ರಾ || ೧ ||

* ನತಭುವನತ್ರಯನೀಕ್ಷರ |
 ಸುತ್ತನವಿರಳಿದಾನೆನಧಿಕಸಿದ್ಧಿ ನಿಧಾನಂ ||
 ಧೃತಪರಶು ಗಣಪತಃಷ್ಟು |
 ತತ್ತ್ವತ್ಯಂ ಕೆಯೋಂದು ಮಾಲ್ಯೈ ನಿವಿಫ್ಫೂತೆಯಂ || ೨ ||

ಸುಕವಿಸ್ತುತ್ತೆ ಲೋಕಿಕವೈ |
 ದಿಕ ವಿವಿಧಾನೇಕೆತಾಸ್ತಸನ್ಮೂತಿ ಜಗ |
 ತ್ವಿಕಟಿಸತ್ತೀತಿ ಗುಣಾ |
 ಧಿಕೇ ೪ ವಾಗ್ನಧು ಸೆಲಷುಗಿನ್ಮು ಮುಖಸರಸಿಜದೇಳ |

ಆನುಪೇಮಂಗುಣಿಗಳ್ಳ ರವಿದ್ವೈ |
 ಜ್ಞಾನರೂ ಶ್ರುತಿಪುರಾಜಾಸ್ತವಿದೋರೈವ ಪುರಾ ||
 ತನ ಕವಿಗಳ ಕಾವ್ಯನಿಬಂ |
 ಧನದೋಜಿ [ಯ ನಿಖಿಳ] ಸಾರಮೆಸೆದಿರೆ ಧರೀಯೋ || ೩ ||

1 ಶ್ರೀಪತಿಯು ಮುನೂಪತಿ ವಾ । ಜೀವತಿಯರ (ರು) ಮೂವರೊಳಿದು ನಮಗಾದರದಿಂ ॥
 ಜಾಪಳಮೆನಿಸುವ (ಮು) ಮತಿಗಳ । ಶ್ರೀಪದಮಂ ಪರಮಪದಮಂ ನೀಗಭಿವಂಘ್ರಾ || ೧ || (ಪಾಠಾಂ)
 — ಈ ಕಂದನೆ ಇಷ್ಟ ಮಾರ್ಗ ಪ್ರಿಯಪುರಿದ್ದೇ ಕಾರಣವು ತಿಂದುಕುದಿಲ್ಲ. ಈ ಪಾಠದಲ್ಲಿ ಹೇಗೆನ್ನುಡಿ
 ಪ್ರಯೋಗಗಳು, ಅನನ್ನಿತ್ಯವೂ ಉಂಟು. ಬಾಯಿರಿಂದ ಈ ಪದ್ಯವು ಒಳಿಯ ಪ್ರತಿಗಳಲ್ಲಿ ಶ್ರುಟಿಕವಾಗಿದ್ದು
 ಲೇಖಿಕರಿಂದ ವಿರಚಿತವಾಗಿ ಸೇರಿಸಲ್ಪಟ್ಟಿರಬಹುದು. 2 ನೆಮಗಳಿಂದ್ಯಾ. 3 ನ್ನೆ. 4 ವಾಗ್ನಂದ್ಯಾ.
 5 ಜ್ಞಾನಪಾಠ. 6 ನೆನಿಸಬ ಶ್ರುತಾಶನ ಸೂಕತನ ... ದೋಜಿ ಸಾರೆ.

* ಅನೇಯ ಸಂಪೂರ್ಣ ಒಂದು ಪ್ರತಿಯಲ್ಲಿ.



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